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Your Personal Exams Guide

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SSC CGL 2016 Tier-II JSO Previous Year Paper (02-Dec-2016)

Total Time: 2 Hour **Total Marks:** 200

Instructions

Sl No.	Section Name	No. of Question	Maximum Marks
1	Quantitative Aptitude	100	200

1.) A total of 120 minutes is allotted for the examination.

2.) The server will set your clock for you. In the top right corner of your screen, a countdown timer will display the remaining time for you to complete the exam. Once the timer reaches zero, the examination will end automatically. The paper need not be submitted when your timer reaches zero.

3.) There will, however, be sectional timing for this exam. You will have to complete each section within the specified time limit. Before moving on to the next section, you must complete the current one within the time limits.

Quantitative Aptitude

1. For determination of mode and median graphically, one considers: **(+2, -0.5)**

a. Bar diagram and Ogive

b. Bar diagram and Line diagram

c. Histogram and Line diagram

d. Histogram and Ogive

---

2. The value of k for which the function **(+2, -0.5)**

\(f\left(x \right) = \left\{ {\begin{array}{*{20}{c}} {k{e^{ - 3x}},}&{x > 0}\\ 0&{elsewhere} \end{array}} \right.\)

is probability density function, is

a. 1

b. 2

c. 3

d. 1 / 3

---

3. In the construction of cost of living index, commodities are selected by: **(+2, -0.5)**

a. simple random sampling

b. stratified random sampling

c. systematic sampling

d. judgement/ purposive sampling.

---

4. If x and y are uncorrelated variables then this implies: **(+2, -0.5)**

a. the absence of any linear relationship between them

b. the absence of any quadratic relationship between them

c. the absence of any logarithmic relationship between them

d. the absence of any trigonometric relationship between them

---

5. In simple random sampling of n units from a population of N units the quantity [1 - (n / N)] is called the **(+2, -0.5)**

a. sampling fraction

b. expansion factor

c. finite population correction factor

d. degrees of freedom

---

6. The coefficient of range of the weights of 10 students from the following data: **(+2, -0.5)**

41, 20, 15, 65, 73, 84, 53, 35, 71, 55 is

a. 1.433

b. 0.696

c. 0.675

d. 1

---

7. Consider simple random sampling with replacement from a population of size N. The number of samples of size n is **(+2, -0.5)**

a. ${}^{N}P_{n}$

b. ${}^{N}C_{n}$

c. N^{n}

d. None of the options

---

8. Under usual notations used for Index Number calculation **(+2, -0.5)**

$\sum p_1 q_0 = 231$,

$\sum p_0 q_0 = 228$,

$\sum p_1 q_1 = 295$,

$\sum p_0 q_1 = 283$,

the value of Paasche's index is:

a. 141.32

b. 132.78

c. 153.9

d. 104.24

---

9. If a population consists of 10 units and SRSWOR is adopted, the probability of selecting a specified sample of 2 units is: **(+2, -0.5)**

a. 1 / 10

b. 1 / 45

c. 1 / 90

d. 1 / 100

---

10. In drawing a sample of size n under SRSWR from a population of size N, the probability that a specified member is included in the chosen sample is **(+2, -0.5)**

a. $\frac{1}{N}$

b. $\frac{n}{N}$

c. $1-\left(1-\frac{1}{N}\right)^{n}$

d. $\frac{(N-1)^{n}}{N^{n}}$

---

11. Suppose a person would earn Rs. 10,000 in base period. Suppose the cost of living index increases by 20% over base period. Then the employers of that person increase his salary by Rs. 1500. Which of the following option is TRUE? **(+2, -0.5)**

a. He is just able to maintain the same standard of living as in base period.

b. He should claim Rs. 500/- as Dearness Allowance.

c. He can improve his standard of living as compared to base period.

d. He should claim Rs. 2,000 as Dearness Allowance.

---

12. The correlation coefficient between two variables X and Y is 0.4. The correlation coefficient between 2X and (-Y) will be: **(+2, -0.5)**

a. 0.4

b. -0.8

c. -0.4

d. 0.8

---

13. Trace out the WRONG option from the following: (CLI= Cost of living index numbers) **(+2, -0.5)**

a. If group indices increase k times, so also CLI does.

b. CLI remains unchanged if all the group indices increase by a constant amount.

c. CLI helps determining Purchasing Power of Money.

d. Dearness Allowance is fixed by considering CLI.

---

14. A sample of 60 students is to be selected from a population of 480 students belonging to 3 different schools. **(+2, -0.5)**

School	N_i(Total No. of Students)	N_i(sample size)
A	120	n_1
B	200	n_2
C	160	n_3

Drawing a sample using proportional allocation technique would give n_1, n_2, $n_3$as

a. 15, 25, 20 respectively

b. 12, 27, 21 respectively

c. 10, 30, 20 respectively

d. 5, 45, 10 respectively

---

15. Relationship between real wage and money wage is given by **(+2, -0.5)**

a. Money wage = Real wage

b. $Realwage = \frac{Cost\ of\ living\ index}{Money\ wage} \times 100$

c. $Realwage = \frac{Money\ wage}{Cost\ of\ living\ index} \times 100$

d. $Realwage = \frac{Money\ wage}{Price\ relation} \times 100$

---

16. When the collected data is grouped with reference to time, we have **(+2, -0.5)**

a. Quantitative classification

b. Qualitative classification

c. Geographical classification

d. Chronological classifications

---

17. In SRSWOR of size n from a population with N units if p is the proportion of sampled units having a given attribute, then unbiased estimate of V(p) is **(+2, -0.5)**

a. $\frac{pq}{(n-1)N}$

b. pq / n

c. N(N - n)pq / (n - 1)

d. $\frac{(N-n)pq}{N(n-1)}$

---

18. The data about the sales and advertisement expenditure of a firm is given below **(+2, -0.5)**

	Sales (in crore of Rs.)	Advertisement exp (in crores of Rs.)
Means	40	6
Standard Daviation	10	1.5

The correlation coefficient between sales and advertisement expenditure is 0.9. The likely sales for a proposed advertisement expenditure of Rs. 10 crore

a. Rs. 64 crores

b. Rs. 67 crores

c. Rs. 70 crores

d. Rs. 58 crores

---

19. Which type of sampling is one where only the first sample unit is selected at random and the remaining units are automatically selected in a definite
sequence at equal spacing from one another. It is: **(+2, -0.5)**

a. Multi stage sampling

b. Quota sampling

c. Systematic sampling

d. Area sampling

---

20. If the mean and the standard deviation of n observations $x_1, x_2, \_ \_ \_ \_ \_, x_n$ be $\bar{x}$ and σ respectively, then the mean and standard deviation of $-x_1, -x_2, -x_3, \_ \_ \_ \_ \_, -x_n$ are, respectively,: **(+2, -0.5)**

a. $\bar{x}, -\sigma$

b. $-\bar{x}, \sigma$

c. $\bar{x}, \sigma$

d. $-\bar{x}, -\sigma$

---

21. A random sample of size n is drawn from a population of size N by SRSWOR method. Then the standard error of sample mean will be zero if n is **(+2, -0.5)**

a. N - 1

b. N

c. tending to infinity

d. none of the options

---

22. The coefficient of correlation between two variables X and Y is 0.48. The covariance is 36. The variance of X is 16. The standard deviation of Y is: **(+2, -0.5)**

a. 10.15

b. 13.32

c. 16.5

d. 18.75

---

23. If 4, 5, 6, 6, 6, 6, 6, 6, 6, 7 be a random sample from a Poisson population with parameter λ, then an unbiased estimate of λ is: **(+2, -0.5)**

a. 4.2

b. 5

c. 5.8

d. 6

---

24. There are 35 students in a hostel. If the number of students increases by 7, the expenses of the hostel increases by Rs. 42 per day while the average expenditure per head diminishes by Re. 1. The original expenditure of the hostel is: **(+2, -0.5)**

a. Rs. 380

b. Rs. 420

c. Rs. 490

d. Rs. 510

---

25. A random sample of size 81 is taken from a normal population with unknown mean μ and known standard deviation σ = 0.90. If the sample mean is $\bar{x}$ = 20 and the upper 2.5% point of a standard normal variable is $T_{0.025}$ = 1.96, then 95% confidence interval for μ is: **(+2, -0.5)**

a. (19.80, 20.20)

b. (18.90, 21.40)

c. (18.60, 21.80)

d. (18.40, 21.60)

---

26. For a bivariate data set on (x, y), if the means, standard deviations and correlation coefficient are **(+2, -0.5)**

$\bar{x}$ = 1.0, $\bar{y}$ = 2.0, s_x = 3.0, s_y = 9.0, r = 0.8

Then the regression line of y on x is:

a. y = 1 + 2.4(x - 1)

b. y = 2 + 0.27(x - 1)

c. y = 2 + 2.4(x - 1)

d. y = 1 + 0.27(x - 2)

27. Consider two univariate normal populations: N(μ1, σ_1^2) and N(μ, σ_2^2) with $\sigma_1^2 = 4\ and\ \sigma_2^2 = 6$. Let $\bar{x}_1$ be the mean of a random sample of size 10 from N(μ_1, σ_1^2) and $\bar{x}_2$ be the mean of a random sample of size 20 from N(μ2, σ_2^2), then the test statistic for testing H_0: $\mu_1 = \mu_2$ is: **(+2, -0.5)**

a. $\sqrt{30}(\bar{X}_1 - \bar{X}_2)/\sqrt{0.7}$

b. $(\bar{X}_1 - \bar{X}_2)/\sqrt{0.7}$

c. $(\bar{X}_1 - \bar{X}_2)^2/0.7$

d. $|\bar{X}_1 - \bar{X}_2|/0.7$

28. Which of the following is a method of collection of primary data? **(+2, -0.5)**

a. Direct personal interview

b. Indirect personal interview

c. Schedules through enumerators

d. All of the options

29. Let -2, 2, 5, 9, -9, 7, -7 be the observations drawn from a population having p.d.f. \(f\left(x \right) = \left\{ {\begin{array}{*{20}{c}} {{e^{ - \left({X - \theta } \right)}},}&{x > \theta }\\ 0&{elsewhere} \end{array}} \right.\) Then the MLE of θ is: **(+2, -0.5)**

a. 9

b. -9

c. -4 / 3

d. 4 / 3

---

30. If the regression line of Y on X is Y = 30 - 0.9X and the standard deviations are $S_x = 2$ and $S_y = 9$, then the value of the correlation coefficient r_{xy} is : **(+2, -0.5)**

a. -0.3

b. -0.2

c. 0.2

d. 0.3

---

31. A coin is tossed repeatedly until a head appears. If 'p' be the probability of getting a head in any toss and x be the number of tosses required to get the first head then which of the following statement is true: **(+2, -0.5)**

a. x is an unbiased estimator of p

b. 1 / x is an unbiased estimator of 1 / p

c. x is an unbiased estimator of 1 / p

d. 1 / x is an unbiased estimator of p

---

32. If $P = \frac{\sum_{i=1}^{n}(x_i - A)^2}{\sum_{i=1}^{n}(x_i - \bar{x})^2}; A \neq \bar{x}$, ($\bar{x}$ = Arithmetic Mean) then P is: **(+2, -0.5)**

a. < 1

b. > 1

c. 1

d. ≠ 1

---

33. Let $x_1, x_2, \_ \_ \_ \_, x_n$ be a random sample of size n from $N(\mu, \sigma^2)$ population where μ and σ are both unknown. For testing $H_0: \mu = \mu_0$ against $H_1: \mu = \mu_1 (\neq \mu_0)$ if one uses the test statistic **(+2, -0.5)**

$$T = \frac{n(\bar{x} - \mu_0)^2}{S^2} \; where : \bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i \; and \; S^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2$$

then H_0 is rejected at level α if:

a. Observed T > $t_{\alpha,n-1}$

b. Observed T > $\chi^2_{\alpha,n-1}$

c. Observed T > Z^2_{α}

d. Observed T > $F_{\alpha;1,n-1}$

---

34. For a trivariate distribution, if the correlation coefficients are $r_{12} = r_{13} = r_{23} = r$, $-1 < r < 1$, then $r_{12.3}$ is: **(+2, -0.5)**

a. (1 - r) / r

b. (1 + r) / r

c. r / (1 + r)

d. r / (1 - r)

---

35. An observation is drawn from an experimental distribution with mean θ, if the observation is found to be 2, and we test $H_0: \theta > 1$ against $H_1: \theta > 1$ with level e^{-3} then **(+2, -0.5)**

a. H_0 will be rejected

b. H_0 will be accepted

c. test will be of power 0.5

d. test will be of power 0.9

---

36. The average of 25 numbers is 36. If the average of first 13 numbers is 32 and that of the last 13 numbers is 39, then the 13th number is **(+2, -0.5)**

a. 27

b. 33

c. 23

d. 21

---

37. In an analysis of variance problem involving 3 treatments and 10 observations per treatment, SSE = 399.6 The MSE for the analysis would be: **(+2, -0.5)**

a. 14.8

b. 133.2

c. 44.4

d. 39.9

---

38. If six hand-writings were ranked by two judges in a competition and the rankings are as follows: **(+2, -0.5)**

	Hand Writing					
	1	2	3	4	5	6
Judge1	6	5	4	3	2	1
Judge2	1	2	3	4	5	6

Then the value of Spearman's rank correlation coefficient is

a. 1

b. 0.5

c. -0.5

d. -1

---

39. In an ANOVA problem for one-way classified data, with three classes and three observations per class, if the F- value is 1.5 and the total sum of squares is 18, then the mean square between classes is: **(+2, -0.5)**

a. 2

b. 3

c. 4

d. 5

---

40. The mean and standard deviation (s.d.) of runs scored by three batsmen A, B and C in 9 consecutive matches are given below, **(+2, -0.5)**

Batsman	Mean	s.d.
A	40	4
B	64	8
C	72	12

Considering coefficient of variations as the measure of consistency, which of the following is correct:

a. A is the most consistent

b. C is the most consistent

c. B is more consistent than A

d. Both (2) and (3)

---

41. In the analysis of two-way classified data if p and q are the number of levels of the two factors then an unbiased estimator for the error variance is given by **(+2, -0.5)**

a. $\frac{SSE}{(p-1)(q-1)}$

b. $\frac{SSA}{p-1}$

c. $\frac{SSB}{q-1}$

d. $\frac{TSS}{pq-1}$

---

42. If a data set contains n paired values on two variables x(independent) and y(dependent), then their plot is called: **(+2, -0.5)**

a. Dendogram

b. Point diagram

c. Scatter diagram

d. Correlogram

---

43. An ANOVA procedure is used for data obtained from five populations. Five samples were taken from the 5 populations each comprising of 20 observations. The degree of freedom associated with F is: **(+2, -0.5)**

a. 5, 95

b. 5, 99

c. 4, 99

d. 4, 95

---

44. The data taken from the publication "sankhya" will be considered as: **(+2, -0.5)**

a. primary data

b. secondary data

c. Either (1) or (2)

d. None of the options

---

45. Suppose r_{xy} is the correlation coefficient between two variables X and Y where s.d.(X) = s.d.(Y). If θ is the angle between the two regression lines of Y on X and X on Y then: **(+2, -0.5)**

a. $sin\theta = \sqrt{\frac{1-r_{xy}^2}{1+r_{xy}^2}}$

b. $cos\theta = \sqrt{\frac{1-r_{xy}^2}{1+r_{xy}^2}}$

c. $tan\theta = \sqrt{1-r_{xy}^2}$

d. $tan\theta = \pm\frac{1-r_{xy}^2}{r_{xy}^2}$

---

46. Which of these statements on variation is INCORRECT? **(+2, -0.5)**

a. Chance causes variations are preventable.

b. Chance causes are beyond the control of human hand.

c. Assignable causes of variation are preventable.

d. Assignable causes can be detected and measured.

---

47. In the one-way analysis of variance model with k factors, let MSE denote the mean sum of squares due to error, MST denote the mean sum of squares
due to factors, MTS denote the mean total sum of squares. For testing and homogeneity of the factor means, the test statistic is **(+2, -0.5)**

a. MSE / MST

b. MSE / MTS

c. MST / MTS

d. MST / MSE

---

48. Suppose two distributions have the same mean, same standard deviation and are equally skewed, but the first distribution is more peaked than the other. This feature of the frequency distributions in which they are different are called: **(+2, -0.5)**

a. Central Tendency

b. Dispersion

c. Symmetry

d. Kurtosis

---

49. In ANOVA for testing the equality of group means, one conducts **(+2, -0.5)**

a. standard normal test

b. chi-square test

c. T-test

d. F-test

---

50. If $P(A \cap B) = 1 / 2$, $P(A^{C} \cap B^{C}) = 1 / 2$ and $2P(A) = P(B) = p$, then the value of p is: **(+2, -0.5)**

a. 1 / 4

b. 1 / 2

c. 1 / 3

d. 2 / 3

---

51. Ratio to trend method for seasonal indices provide good results if: **(+2, -0.5)**

a. the periods are given six monthly

b. the periods are of short duration

c. the periods are of long duration

d. All of the options

---

52. In a class, there are 25 students whose average age decreases by 3 months when one student aged 22 years is replaced by a new student. The age of the new student is: **(+2, -0.5)**

a. 16 Yrs 2 months

b. 20 Yrs 5 months

c. 15 Yrs 9 months

d. 18 Yrs 3 months

---

53. Based on results of 2 way ANOVA, the SSE was computed to be 139.4. If we ignore one of the factors and perform one way ANOVA using the same data, SSE will: **(+2, -0.5)**

a. increase

b. decrease

c. remain same

d. Either (1) or (2)

---

54. If the annual trend of production (Y) of a certain commodity in a factory with origin 2,000 and X unit = one year is Y = 148.8 + 7.2X Then the monthly trend equation is: **(+2, -0.5)**

a. Y = 12.4 + 0.05X

b. Y = 12.4 + 0.6X

c. Y = 148.8 + 0.6X

d. None of the options

---

55. If A_1, A_2 and A_3 are three independent events with $P(A_1) = 1/3$, $P(A_2) = 1/4$ and $P(A_3) = 2/5$, then the probability that exactly one of the events occurs is: **(+2, -0.5)**

a. 3 / 20

b. 1 / 10

c. 9 / 20

d. 3 / 10

---

56. If the trend line with 2008 as origin is Y = 20.6 + 1.68X, then the trend line with 2004 as origin is: **(+2, -0.5)**

a. Y = 34.61 + 1.68X

b. Y = 20.6 + 6.72X

c. Y = 13.88 + 1.68X

d. None of the options

---

57. Moments are statistical constants from which we can find the different features of a distribution. Which one of the following is INCORRECT? **(+2, -0.5)**

a. First Central Moment is the mean.

b. Second Central moment is the variance.

c. Second and Central Moments are needed to find skewness.

d. Second and fourth central moments are needed to find the kurtosis.

---

58. If the equation of exponential trend with 2004 as origin is $Y = 20(1.5)^X$, Then equation of the exponential trend with 2006 as origin is: **(+2, -0.5)**

a. $Y = 20(1.5)^X$

b. $Y = 45(1.5)^X$

c. $Y = 8.89(1.5)^X$

d. $Y = 20 / (1.5)^X$

---

59. A closet contains 8 pairs of shoes. If 4 shoes are chosen at random, then the probability that all the four shoes are of the same type (left or right) is: **(+2, -0.5)**

a. 1 / 13

b. 2 / 13

c. 3 / 13

d. 4 / 13

---

60. Demand for seats in a university is at its highest in the fall; demand also trends to grow and fall off in 25 year waves. In time service forecasting, the former demand characteristic would be called _____ and the latter would be called _____. **(+2, -0.5)**

a. seasonality; cyclicality

b. cyclicality; seasonality

c. randomality; seasonality

d. seasonality; variability

---

61. Fill up the blank: The secular trend is the part of time points where more or less regular and _____ is observed showing either the tendency of growth or decline. **(+2, -0.5)**

a. long-term movement

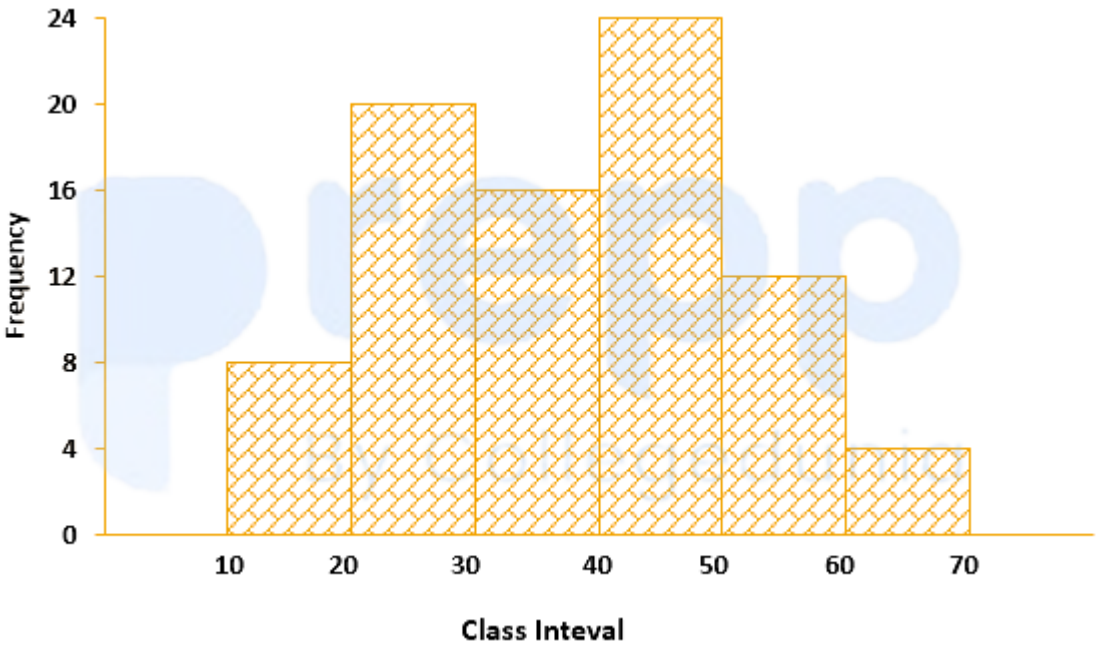
b. short-term movement

c. oscillatory movement

d. None of the options

---

62. Following histogram shows certain frequency distribution against class intervals. **(+2, -0.5)**



The approximated mean of this distribution is:

a. 34.34

b. 35.42

c. 37.86

d. 36

---

63. In a multiplicative time series model, the seasonal indices computed by the ratio-to-trend method **(+2, -0.5)**

a. are alternate in sign

b. add to 0

c. add to 1

d. multiply to 1

---

64. For two equally likely, exhaustive and independent events A and B, P(A ∩ B) is: **(+2, -0.5)**

a. 0

b. 1

c. 0.5

d. 0.25

---

65. To remove quadratic trend from an additive time series, differencing: **(+2, -0.5)**

a. cannot be used.

b. should be used once.

c. should be used twice.

d. should be used at least three times.

---

66. For four observations -1, 0, 1, 4, the measure of kurtosis equals **(+2, -0.5)**

a. 1

b. 2

c. 3

d. 4

---

67. In multiplicative model of time series: $X_t = T_t x S_t x C_t x I_t$, where T_t, S_t, C_t, I_t are trend, seasonal, cyclical and irregular components, what can be said **(+2, -0.5)**

about the values of I_t?

a. I_t is a random positive quantity

b. It is a random negative quantity

c. It is non-random positive real quantity

d. It is a non-random negative quantity

---

68. Let A and B be the two possible outcomes of an experiment and suppose P(A) = 0.4, P(A U B) = 0.7 and P(B) = p, for what choice of p, A and B independent? **(+2, -0.5)**

a. 0.2

b. 0.3

c. 0.4

d. 0.5

---

69. Consider the following time series data: **(+2, -0.5)**

Year t	1990	1991	1992	1993	1994
Y_t	5	7	3	6	9

Fitting a straight-line, is the trend value for the year 1992 is:

a. 3

b. 4

c. 5

d. 6

---

70. If the arithmetic mean is 26.8 and the median is 27.9, then the mode is: **(+2, -0.5)**

a. 27.3

b. 29.3

c. 30.1

d. 27.4

---

71. In time series analysis which source of variation can be estimated by the ratio-to-trend method: **(+2, -0.5)**

a. trend

b. seasonal variation

c. seasonal index

d. cyclical fluctuations

---

72. The probability that a contractor gets a plumbing contract is 2 / 3 and the probability that he will not get an electric contract is 5 / 9. If the probability of getting at least one contract is 4 / 5, then the probability that he will get both the contracts is: **(+2, -0.5)**

a. 13 / 45

b. 14 / 45

c. 16 / 45

d. 17 / 45

---

73. If a time series data is given below then find three yearly moving averages to find trend. **(+2, -0.5)**

Year	Value in lakh tons
1998	30
1999	35
2000	25
2001	42
2002	62

Which one of the options is correct:

a. 30, 34, 43

b. 90, 102, 129

c. 35, 25, 42

d. 43, 33, 30

---

74. If the actual values in time series from 2000 to 2006 are 77, 88, 94, 85, 91, 98 and 90 and the equation of the trend line with 2003 as origin is Y = 89 + 2X , then in case of multiplicative model, the trend eliminated values are: **(+2, -0.5)**

a. 0.93, 1.04, 1.08, 0.96, 1.0, 1.05, 0.95

b. 1.08, 0.96, 0.92, 1.04, 1.0, 0.95, 1.05

c. 0.93, 0.96, 1.08, 1.04, 1.0, 0.95, 1.05

d. None of the options

---

75. A and B are two independent events in a given sample space and the probability that both A and B occur is 0.16 while the probability that neither occurs is 0.36, then P(A) and P(B), respectively are **(+2, -0.5)**

a. 0.6, 0.6

b. 0.8, 0.2

c. 0.4, 0.4

d. 0.9, 0.4

---

76. Link relatives in a time series remove the influence of: **(+2, -0.5)**

a. trend

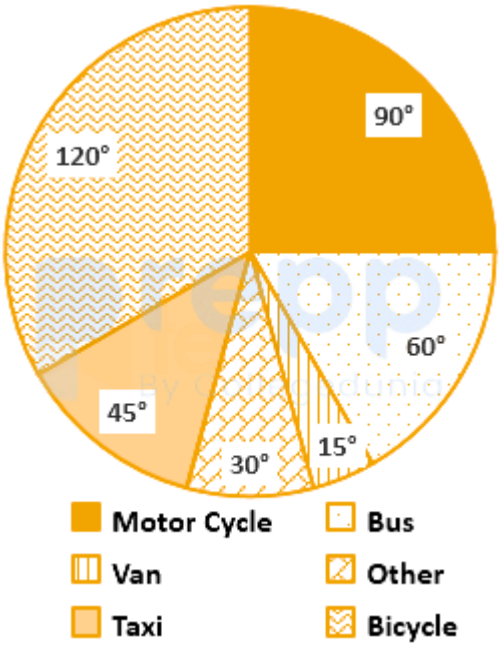
b. cyclic variation

c. irregular variation

d. All of the options

---

77. The annual vehicles production (in lacs) in india is given in the pie chart. **(+2, -0.5)**



If the annual production of motor cycle is 1.80 lacs, the annual production of Bicycle is

a. 2.6 lacs

b. 2.4 lacs

c. 2.5 lacs

d. 2.1 lacs

---

78. Let E and F be two events with $P(E) > 0$, $P(F|E) = 0.3$ and $P(E \cap F^c) = 0.2$. Then $P(E)$ equals: **(+2, -0.5)**

a. 1/7

b. 2/7

c. 4/7

d. 5/7

79. If the trend equation fitted from a data on production (y in kg) of a fertilizer factory is 26y = 5335 + 624t, where time(t) has unit 1 year. Then monthly increase in production of fertilisers (in kg) is: **(+2, -0.5)**

a. 5335

b. 5335 / 26

c. 624

d. 2

80. The probability that an urn containing 5 balls contains only white balls if the first two balls drawn from it were found to be white is: **(+2, -0.5)**

a. 1 / 20

b. 1 / 10

c. 1 / 2

d. 1 / 4

81. Suppose owing to increased prices, a consumer reduces consumption of all commodities by 10% compared to the previous year. If I_L and I_P are the Laspeyres' and Paasche's price indices for the current year with the previous year as base, then **(+2, -0.5)**

a. $I_P = 0.9 \text{ X } I_L$

b. IL = 0.9 X IP

c. $I_P \times I_L = 0.9 \times (100)^2$

d. IP = IL

---

82. The standard deviation of a distribution is 5. The value of the fourth central moment, in order that the distribution be mesokurtic, should be: **(+2, -0.5)**

a. equal to 3

b. greater than 1875

c. equal to 1875

d. less than 1875

---

83. If 'I' represents a cost of living index, then the purchasing power of money is proportional to **(+2, -0.5)**

a. I

b. I^2

c. $\sqrt{I}$

d. 1 / I

---

84. The system of combining two or more overlapping series of index numbers to obtain a single continuous series is called **(+2, -0.5)**

a. Base shifting

b. Splicing

c. Deflating

d. None of the options

85. The formula for calculating an index number should be such that it gives the same ratio between one point of comparison and the other, no matter which of the two is taken as the base, or putting it another way, the index number reckoned forward should be reciprocal of the one reckoned backward'- which test of consistency of index number is this? **(+2, -0.5)**

a. Unit Test

b. Time Reversal Test

c. Circular Test

d. Factor Reversal Test

86. Event S and T are independent with $P(S) < P(T)$, $P(S \cap T) = 6 / 25$ and $P(S|T) + P(T|S) = 1$. Then $P(S)$ is: **(+2, -0.5)**

a. 6 / 25

b. 3 / 5

c. 1 / 5

d. 2 / 5

87. Initially there are 9 workers, all being paid a uniform wage. Later a 10th worker is added whose wage rate is Rs. 20 less than for the others. The average wage gets: **(+2, -0.5)**

a. decreased by Rs. 20

b. decreased by Rs. 10

c. remains unchanged

d. decreased by Rs. 2

---

88. If L(p) and L(q) represent Laspeyres' index number for prices and quantities and P(p) and P(q) represents Paasche's index number for price and quantities then: **(+2, -0.5)**

a. $\frac{L(p)}{L(q)} = \frac{P(p)}{P(q)}$

b. $\frac{L(p)}{L(q)} = \frac{P(q)}{P(p)}$

c. $\frac{L(p)}{L(q)} > \frac{P(p)}{P(q)}$

d. $\frac{L(p)}{L(q)} < \frac{P(p)}{P(q)}$

---

89. Let x be a random variable with probability mass function **(+2, -0.5)**

\(f\left(x \right) = \left\{ {\begin{array}{*{20}{c}} {k.|x|,}&{ifx = -2,1,3}\\ {0,}&{otherwise} \end{array}} \right.\)

where, K is a constant. Then the variance of x is:

a. 23/ 6

b. 5

c. 6

d. 37 / 6

---

90. For a frequency distribution of a variable x, mean = 32, median = 30. The distribution is: **(+2, -0.5)**

a. Positively skewed

b. Negatively skewed

c. Mesokurtic

d. Platykurtic

---

91. It is known from past experience that in a certain plant there are on the average 4 industrial accidents per month. The probability that in a given month there will be less than 4 accidents is: ($e^{-4} = 0.0183$) **(+2, -0.5)**

a. 0.398

b. 0.433

c. 0.442

d. 0.465

---

92. For a frequency distribution of a discrete variable, the diagram of less than type cumulative frequency is a **(+2, -0.5)**

a. non-increasing step function

b. non-decreasing step function

c. non-increasing continuous function

d. non-decreasing continuous function

---

93. If a continuous random variable x has the probability density function **(+2, -0.5)**

\(f\left(x \right) = \left\{ {\begin{array}{*{20}{c}} {3x^2,}&o\le x\le1\\ {0,}&{elsewhere} \end{array}} \right.\)

then the value of a such that P[x ≤ a] = P[x > a] is:

a. 1/2

b. 1/3

c. $\left(\frac{1}{3}\right)^{\frac{1}{2}}$

d. $\left(\frac{1}{2}\right)^{\frac{1}{3}}$

---

94. In a negatively skewed distribution **(+2, -0.5)**

a. Mean > Mode > Median

b. Mode > Median > Mean

c. Mean > Median > Mode

d. Mode < Median > Mean

---

95. Let x ~ Binomial (5,0.6) and Y ~ Poisson (2) be independent. Then P(xy = 0) equals: **(+2, -0.5)**

a. $e^{-2}.(0.4)^5$

b. $e^{-2} + (0.4)^5$

c. $e^{-2} + (0.4)^5 - e^{-2}.(0.4)^5$

d. $e^{-2} + (0.6)^5 + (1 - e^{-2})(0.4)^5$

---

96. The mean and standard deviation of a variable x are 36 and 4 respectively. Then the mean and standard deviation of [50 - (x / 4)], respectively are: **(+2, -0.5)**

a. 41, 1

b. 29, 2

c. 40, 1

d. 39, 4

---

97. The Joint distribution of x and y is as follows **(+2, -0.5)**

x→	1	2
y↓		
1	0.4	0.2
2	0.1	0.3

Then E(x|y = 1) is:

a. 2 / 3

b. 5 / 3

c. 2

d. 4 / 3

---

98. If a variable has three values -k, 0 and 3k with corresponding frequencies as 3k, 2k and k respectively, then the value of coefficient of skewness b1 is : **(+2, -0.5)**

a. 2K

b. 2

c. 1 / 2

d. K / 2

---

99. If x is a continuous random variable with p.d.f. **(+2, -0.5)**

f(x) = 1/√2π e -x2/2dx , $-\infty < x < \infty$

and y is defined as y = x + 1, then E(y) equals:

a. 1

b. 0

c. n

d. (√n) + 1

---

100. If μrbe the r th order central-moment of a population μ_0, μ_1 and μ_2 are: **(+2, -0.5)**

(where, σ = standard deviation)

a. 0, 1, σ^2

b. 1, 0, σ^2

c. 1, 1, σ

d. 1, 0, σ

Answers

1. **Answer: d**

Explanation:

Explanation

In the determination of median graphically we adopt any of the two methods. In both the methods we draw ogives as per requirement.

To calculate mode graphically a histogram of the given data is drawn at first.

∴ For determination of mode and median graphically, one considers Histogram and Ogive

⭐ Important Points

Bar diagram = A bar chart or bar graph is a chart or graph that presents categorical data with rectangular bars with heights or lengths proportional to the values that they represent.

We can represent Mean on Bar graph

Ogive = An ogive (oh-jive), sometimes called a cumulative frequency polygon, is a type of frequency polygon that shows cumulative frequencies. In other words, the cumulative percents are added on the graph from left to right.

We represent partition value on ogive curve like median

Line graph = line graph is a type of chart used to show information that changes over time. We plot line graphs using several points connected by straight lines. We also call it a line chart

---

2. **Answer: c**

Explanation:

Given

$f(x) = \{ ke^{-3x}, x > o$

$\{ 0, elsewhere$

Concept used

$$\int_{-\infty}^{\infty} f(x)\,dx = \int_{-\infty}^{0} f(x)\,dx + \int_{0}^{\infty} f(x)\,dx = 1$$

Calculation

According to given part

$\Rightarrow \int_{-\infty}^{0} f(x)\,dx = 0$

$\Rightarrow 0 + \int_{0}^{\infty} f(x)\,dx = 0$

$\Rightarrow \int ke^{-3x}\,dx = 1$

$\Rightarrow k[-e^{-3x}/3]$

$\Rightarrow -k/3[e^{-\infty} - e^{0}] = 1$

$\Rightarrow -k/3(0 - 1) = 1$

$\Rightarrow k./3 = 1$

∴ The value of k = 3 for PDF

---

3. Answer: d

Explanation:

Explanation

In the constructing of cost of living index, the commodities are selected by judgement/purposive sampling. In this method of sampling the choice of the sample items depends exclusively on the judgement of the investigator

⭐ Important Points

Simple random sampling = It is a sampling technique where every item in the population has an even chance and likelihood of being selected in the samplr

In it selection of items completely depends on chance or by probability and each item has equal chance to be selected

It is also known as the method of chances

Stratified random sampling = With this sampling, the researcher divides the population into separate groups called strata. Then, a probability sample (often a simple random sample) is drawn from each group.

For example, Dividing the entire state into 3 - 4 geographical regions and then selecting a required sample of districts from each of these regions .

Systematic sampling = In this sample members from a large population are selected according to a random starting point but with a fixed, periodic interval and this interval is called sampling interval(k)

The sampling interval = Population size/sample size = N/n

---

4. **Answer: a**

Explanation:

Explanation

If x and y are uncorrelated variables then there can not be any line of regression between them drawn and therefore there is no line of regression relationship between them

∴ Option 1 is correct

⭐ Important Points

The line of regression = The line $y = a + bx$ which is fitted to a set of n points (x_i, y_i) by the method of least square called line of regression of y on x. similarly if regression $x = a + by$ is fitted to (x_i, y_i) is called line of regression of x on y

The coefficient of correlation is the GM between the regression coefficient

---

5. **Answer: c**

Explanation:

Explanation

I understand that when sampling from a finite population and our sample size is more than 5% of the population, we need to make a correction on the sample's mean and standard error using this formula:

⇒ FPC = N - n/(N - 1)

Where N is the population size and n is the sample size.

∴ In simple random sampling of n units from a population of N units the quantity [1 - (n / N)] is called the finite population correction factor

---

6. **Answer: b**

Explanation:

Formula

Coefficient of range = (L - S)/(L + S)

L = Largest number

S = Smallest number

Calculation

Coefficient of range is denoted by R

⇒ Largest number of series = 84

⇒ Smallest number of series = 15

⇒ R = (84 – 15)/(84 + 15)

⇒ R = 69/99

∴ Coefficient of range is 0.696

⭐ Important Points

The rangeis the simplest measure of dispersion. We can define the range as the difference between the highest and the lowest value in a set of observation

For example the range of the series 1, 2, 4, 6, 8, 9, 10, 12

Largest number = 12

Lowest number = 1

Range = L - S = 12 - 1 = 11

Coefficient of range = (L - S)/(L + S)

Coefficient of this range = 11/13

---

7. **Answer: c**

Explanation:

Explanation

When n units are selected with SRSWR, the total number of possible samples are N^n

⭐ Important Points

Simple random sampling = It is a sampling technique where every item in the population has an even chance and likelihood of being selected in the samplr

In it selection of items completely depends on chance or by probability and each item has an equal chance to be selected

It is also known as method of chances

The simple random sampling with replacement = It is called SRSWR, in it a unit is selected from the sampling frame. The unit is replaced back and the next unit is selected. This process is repeated till a sample of the desired size is selected.

When n units are selected with SRSWR, the total number of possible samples are N^n

The probability of drawing a sample is $1/N^n$.

---

8. **Answer: d**

Explanation:

Given

$\sum p_1 q_0 = 231$,

$\sum p_o q_o = 228$,

$\sum p_1 q_1 = 295$,

$\sum p_o q_1 = 283$,

Formula

$P_{01} = [\sum p_1 q_1 / \sum p_o q_1]$

P_1= Price in current year

q_1= quantity in current year

p_o= price in base year

q_0= quantity in base year

Formula

According to the formula

$P_{01} = (295/283) \times 100$

$\Rightarrow 104.24$

∴ The value of paasche's index is 104.24

The general formula for Paasche's index number is

$P = [\sum(p_n q_n / \sum p_o q_n] \times 100$

Where

q_n= are quantities bought or sold in the current year

---

9. **Answer: b**

Explanation:

Given

Population N = 10

Sample n = 2

Concept

The probability of selecting sample in SRSWOR is $1/ {}^{N}c_{n}$

${}^{N}C_{n} = N!/n!(N - n)!$

Calculation

The required probability is $1/ {}^{10}c_{2}$

$\Rightarrow 1/(10!/(2!(10 -2)!$

$\Rightarrow 10!/2!/8!$

$\Rightarrow (8! \times 2!)/10!$

$\Rightarrow 1/45$

∴ the probability of selecting a specified sample of 2 units is 1/45

When we select as SRSWR the probability of selecting sample is $1/N^{n}$

---

10. **Answer: c**

Explanation:

Explanation

The probability of selecting the specified member from a population size of N will be 1/N

∴ The probability of not selecting the specified member = 1- 1/N

⇒ (N – 1)N

∴ The probability of not including the specified member in the choosen sample = $(1 - 1/N)^n$

∴ The probability of always including the specified member in the specified sample is $1 - (1 - 1/N)^n$

The simple random sampling with replacement = It is called SRSWR, in it a unit is selected from the sampling framE. The unit is replaced back and the next unit is selected. This process is repeated till a sample of the desired size is selected.

When n units are selected with SRSWR, the total number of possible samples are N^n

---

11. Answer: b

Explanation:

Given

person would earn Rs. 10,000 in base period.

the cost of living index increases by 20% over base period.

Calculation

The cost of living index increases by 20%

For maintaining the same living standard the employee should get a monthly income of

⇒ 10000 × 20/100

∴ Rs.2000

Then the employers of that person increase his salary by Rs. 1500

∴ 2000 – 1500 = Rs.500

∴ **He should claim Rs. 500/- as Dearness Allowance**

The consumer price index = (cost of goods and service in given year)/(cost of goods and services in base year) × 100

---

12. Answer: c

Explanation:

Given

The correlation coefficient between two variables X and Y = 0.4

Concept used

The correlation coefficient (r) is independent of origin and scale and depend on the sign of variables

Calculation

The correlation coefficient between the two variables is the measure of the slope between the variables in the regression graph. It is given that the correlation coefficient between X and Y is 0.4 and the correlation coefficient is independent of change of origin and scale but it depends on variables

∴ The correlation coefficient between 2X and (-Y) is - 0.4

⭐ Important Points

The value of simple correlation coefficient in the interval of [-1, 1]

The regression coefficient is independent of the change of origin. But, they are not independent of the change of the scale. It means there will be no effect on the regression coefficient if any constant is subtracted from the values of x and y

---

13. **Answer: b**

Explanation:

Explanation

The cost of living also known as consumer price index is the country's principal measure of price change.

⇒ Cost of living index is denoted by CLI

⇒ CLI = $\sum I_w / \sum w$

Where as, I = Relative price

W = Weight

∴ Each I in the group increases K times. If group indices increase k times so also CLI does

⭐ Important Points

CLI in terms of purchasing power

Purchasing power of money = (1/CLI) × 100

---

14. **Answer: a**

Explanation:

Given

Total number of students to be selected = 60

Size of the population = 180

Calculation

$n_1 = (60/480) \times 120$

⇒ 15

$n_2 = (60/480) \times 200$

⇒ 25

$n_3 = (60/480) \times 160$

⇒ 20

∴ The value of n_1, n_2, and n_3 are 15, 25, 20

⭐ Important Points

Proportional stratified sampling = Proportional stratified sampling also called proportionate stratification and stratified sampling with proportional allocation) is

one of the most commonly applied forms of stratified sampling. In proportional stratified sampling, the researcher creates a stratified sampling frame, determine the sample sizes for the strata such that the sample size are proportional to the population strata sizes and then selects a random sample of the appropriate size from each stratum. As a result, the sample strata will be proportional to their sizes in the population and random in every other respect

---

15. **Answer: c**

Explanation:

Explanation

The consumer index number (CPI) or cost living index number are helpful in wage negotiation, formulation of income policy, price policy, rent control, taxation and general economic policies formulation .

⇒ The CPI is used in calculating the purchasing power of money and real wages

⇒ The purchasing power of money = (1/cost of living index)

⇒ Real wages wage = (Money wage/cost of living index) × 100

∴ The relationship between the real wage and money wage is given by $Realwage = \frac{Money\ wage}{Cost\ of\ living\ index} \times 100$

---

16. **Answer: d**

Explanation:

Explanation

Qualitative classification is defined as the data that approximates and characterizes. Qualitative data can be observed and recorded. This data type is non-numerical in nature. This type of data is collected through methods of

observations, one-to-one interviews, conducting focus groups , and similar methods.

Chronological classification = In such a series, time is the main factor according to which data is arranged. For example the production of milk in the country over a period of time

Geographical classification = Place, location or geographical division is the main factor in such a series. For example, a number of listed consumer's goods companies in different countries

Quantitative classification = When data is classified according to measurable characteristics such as height and weight it is quantitative classification of data. Quantitative data are expressed in terms of number. For example, classification of data based on the height of students in a class

∴ When the collected data is grouped with reference to time, we have Chronological classification

---

17. **Answer: d**

Explanation:

Explanation

Suppose that a simple random sample of size n is selected and n_1 unit in this sample belong to the class C.

Lert $p = n_1/n$ be the sample proportion of units in the class C.

$\Rightarrow \bar{y} = n_1/n = p$

$\Rightarrow S^2_y = npq/(n-1)$

We have two cases

(i)- SRSWOR

When p is an unbiased estimator of P

$\Rightarrow Var(p) = [(N - n)/(N - 1)] \times PQ/n$

$\Rightarrow$ Est. $Var(p) = [(N - n)/N] \times pq/(n - 1)$

$\Rightarrow rse(p) = \sqrt{Var(p)}/P$

$\Rightarrow \sqrt{[(N - n)/(N - 1)]} \times \sqrt{}Q/Pn$

$\therefore$ **$Var(p) = [(N - n)/(N - 1)] \times PQ/n$**

⭐ **Important Points**

For SRSWR

p is an unbiased estimator of P

(ii) - Var (p) = PQ/n

Est Var(p) = PQ/(n - 1)

rse(p) = $\sqrt{Var(p)}/P = \sqrt{Q}/Pn$

---

18. Answer: a

Explanation:

Given

$\bar{X}$ = mean of sales = 40

$\bar{Y}$ = mean of advertisement cost = 6

Formula

Regression equation of X and Y = $X - \bar{X} = r(x/y)(Y - \bar{Y})$

Calculation

⇒ X - 40 = 0.09(10/1.5)(Y - 6)

⇒ X - 40 = (9/1.5)(Y - 6)

⇒ X - 40 = 6(Y - 6)

⇒ X - 40 = 6Y - 36

⇒ X = 6Y + 4

⇒ X = 6(10) + 4

∴ The likely sales for a proposed advertisement expenditure of Rs. 10 crore is 64 crore

---

19. Answer: c

Explanation:

Explanation

Systematic sampling = In this sample members from a large population are selected according to a random starting point but with a fixed, periodic interval and this interval is called sampling interval(k)

The sampling interval = Population size/sample size = N/n.

Quota sampling = It is non prbbaility version of stratified sampling. In this assembled sample has the same proportions of individuals as the entire population with respect to known characteristics, traits.

Multi stage sampling = It is the taking of samples in stages using smaller and smaller sampling units at each stage. It can be a complex form of cluster sampling.

Area sampling = It is sometimes referred to as block sampling, especially in the United States. It is also a form of cluster sampling. Evaluation. Area sampling is used a great deal in countries where there are no adequate population lists, which are replaced instead by maps.

∴ Option 3 is correct

20. **Answer: b**

Explanation:

Explanation

Mean of $x_1, x_2, \text{---------}, x_n = \bar{x}$

$\Rightarrow$ Mean of $-x_1, -x_2 \text{ -------- } -x_n$

$\Rightarrow$ Mean of $-(x_1 + x_2 \text{ --------} x_n)/n$

$\Rightarrow$ Mean of new observation $= -\bar{x}$

Standard deviation $= \sqrt{[(\sum(x_i - \bar{x})^2/N]}$

$(x_i - \bar{x})^2$ is always positive

$\therefore$ Mean and standard deviation is $-\bar{x}$ and σ

21. **Answer: b**

Explanation:

Explanation

The error arising out due to drawing inference about the population on the basis of few observations(sampling) is termed sampling error. Such errors are non existent in complete enumeration survey.

$\therefore$ The standard error of the sample mean will be zero if n is N

⭐ Important Points

Simple random sampling = It is a sampling technique where every item in the population has an even chance and likelihood of being selected in the sample

In it selection of items completely depends on chance or by probability and each item has equal chance to be selected

It is also known as method of chances

The simple random sampling with replacement = It is called SRSWR, in it a unit is selected from the sampling fram E. The unit is replaced back and the next unit is selected. This process is repeated till a sample of the desired size is selected.

When n units are selected with SRSWR, the total number of possible samples are N^n

The probability of drawing a sample is $1/N^n$.

---

22. Answer: d

Explanation:

Given

$\sigma_x = \sqrt{16} = 4$

r = 0.48

Covariance = $\sum xy/N = 36$

Fomula

Covariance = $\sum xy/N$

$r = \sum xy/N.\sigma_x \times \sigma_y$

Calculation

According to question

$\Rightarrow 0.48 = 36/4 \times \sigma_y$

$\Rightarrow \sigma_y = 9/0.48$

∴ The standard deviation of y(σ_y) is 18.75

---

23. Answer: c

Explanation:

Formula

$\lambda = N/n$

Calculation

$N = (4 + 5 + 6 + 6 + 6 + 6 + 6 + 6 + 6 + 7) = 58$

$N = 10$

$\Rightarrow \lambda = 58/10$

∴ Unbiased estimate of λ is 5.8

---

24. Answer: b

Explanation:

Formula

Average = Sum of observation/number of observations

Calculation

Let the average expenditure be Rs.x

Total expenditure be 35x

When the number of students increased by 7, the average expenditure decreases by 1 and the total per day expenses increases by 42

According to question

⇒ 42(x - 1) - 35x = 42

⇒ 7x - 42 = 42

⇒ 7x = 84

⇒ x = 12

∴ The total expenditure of the hostel is 12 × 35 is Rs. 420

---

25. Answer: a

Explanation:

Given

$\bar{X}$ = Sample mean = 20

N = sample size = 81

T 0.025 = 1.96 = Z = Upper critical valuye

Formula

$\bar{X} \mp (z \times \sigma/\sqrt{N})$

Calculation

According to the formula

$\Rightarrow 20 \mp [1.96 \times 0.90/\sqrt{81}]$

$\Rightarrow [20 - 1.96 \times 0.90/\sqrt{81}]\ [20 + 1.96 \times 0.90/\sqrt{81}]$

⇒ [20 - 1.96(0.1)][20 + 1.96(0.1)]

⇒ [20 - 0.196][20 + 0.196]

⇒ [19.80][20.20]

∴ 95% confidence interval for μ is [19.80][20.20]

---

26. Answer: c

Explanation:

Formula

The regression line of y on x is given as

$y - \bar{y} = r \times \sigma_y(x - \bar{x})/\sigma_x$

Calculation

According to the question

$y - 2 = 0.8 \times 9(x - 1)/3$

$\Rightarrow y - 2 = 2.4(x - 1)$

$\therefore y = 2 + 2.4(x - 1)$

---

27. Answer: b

Explanation:

Formula

$H_O : \mu_1 = \mu_2$ is given by

$(\bar{x}_1 - \bar{x}_2)/\sqrt{(\sigma_1^2/n_1 + \sigma_2^2/n_2)}$

Calculation

According to the formula

$\Rightarrow (\bar{x}_1 - \bar{x}_2)/\sqrt{(4/10 + 6/20)}$

$\Rightarrow (\bar{x}\,1 - \bar{x}\,2)/\sqrt{(0.4 + 0.3)}$

∴ The test statistic for testing H 0 : μ 1 = μ 2 is $(\bar{x}\,1 - \bar{x}\,2)/\sqrt{(0.7)}$

---

28. Answer: d

Explanation:

Explanation

We can collect the primary data from direct personal interview, indirect personal interview and schedules through enumerators

∴ All options are correct

---

29. Answer: a

Explanation:

Given

Observations = -2, 2, 5, 9, -9, 7, -7

Pdf = $f\left(x \right) = \left\{ {\begin{array}{*{20}{c}} {{e^{ - \left({X - \theta } \right)}},}&{x > \theta }\\ 0&{elsewhere} \end{array}} \right.$

Formula

Likelihood function is given by

$L\left({x;\theta } \right) = \;\mathop \prod \limits_{i = 1}^n \) f(x ¡; θ)

Calculation

$L(x; \theta) = \mathop \prod \limits_{i = 1}^n e^{-(x - \theta)}$

Taking log on both side

$\Rightarrow$ Log $L(x; \theta) = \mathop \prod \limits_{i = 1}^n \log(\mathop \prod \limits_{i = 1}^n e^{-(x - \theta)}$

$\Rightarrow \mathop \prod \limits_{i = 1}^n (x_i - \theta])\log e)$

Log L is not differentiable w.r.t θ

According to maximum likelyhood principle

Log l has to be maximised

Log L is maximum if $\sum(x_i - \theta)$ is minimum

The mean deviation about a constant $\theta = \mathop \sum \limits_{i = 1}^n (x_i - \theta)$

When x is odd than θ = Median$(x_1, x_2, ----x_n)$

∴ Median of (-2, 2, 5, 9, -9, 7, -7) is 9

∴ Then the MLE of θ is 9

---

30. Answer: b

Explanation:

Calculation

The regression line of Y on X is Y = 30 - 0.9x

$\Rightarrow$ Y - 30 = - 0.9x

The regression equation line of Y on X is = $y - y_1 = r(s_y/s_x)(x - x_1)$

Comparing both equations, we get

$\Rightarrow r(s_y/s_x) = -0.9$

$\Rightarrow r(9/2) = -0.9$

$\Rightarrow r = (-0/9 \times 2)/9 = -0.2$

∴ The value of the correlation coefficient r xy is -0.2

---

31. Answer: c

Explanation:

Explanation

A coin is tossed repeatedly until a head appears. If 'p' be the probability of getting a head in any toss and x be the number of tosses required to get the first head then **x is an unbiased estimator of 1 / p**

---

32. Answer: b

Explanation:

Calculation

According to the question

$A < \bar{x}$

If $P = \frac{\sum_{i=1}^{n}(x_i - A)^2}{\sum_{i=1}^{n}(x_i - \bar{x})^2}$ > 1

---

33. Answer: b

Explanation:

Explanation

⇒ The H_o is rejected at level α if

⇒ $T > F_{\alpha}$;, n - 1

∴ H 0 is rejected at level α if observed $T > \chi$ 2 α,n-1

---

34. Answer: c

Explanation:

Given

$r_{12} = r_{13} = r_{23} = r$

Formula

$r_{12.3} = (r_{12} - r_{13}.r_{23})/\sqrt{[(1 - r_{12}^2)(1 - r_{23}^2)}$

Calculation

According to question

⇒ $(r - r \times r)/\sqrt{(1 - r^2)(1 - r^2)}$

⇒ $(r - r^2)/(1 - r^2)$

⇒ $r(1 - r)/(1 - r)(1 + r)$

⇒ The value of $r_{12.3}$ is $r/(1 + r)$

---

35. Answer: b

Explanation:

Explanation

An observation is drawn from an experimental distribution with mean θ, if the observation is found to be 2, and we test H 0: θ >1 against H 1: θ >1 with level e -3 then H_o will be accepted

---

36. Answer: c

Explanation:

Given

The average of 25 number = 36

The average of first 13 number = 32

Sum of last 13 number = 39

Calculation

Sum of 25 numbers = 25 × 36 = 900

⇒ Sum of first 13 number = 13 × 32 = 416

⇒ Sum of last 13 number = 13 × 39 = 507

⇒ The value of 13th number = (416 + 507) - 900

∴ The value of 13th number is 23

---

37. Answer: a

Explanation:

Formula

MSE = SSE/r(c - 1)

MSE = Variance within the sample

SSE = Sum of the squares of the error

Calculation

According to the question

⇒ MSE = 399.6/3(10 - 1)

⇒ MSE = 399.6/(3 × 9)

⇒ MSE = 399.6/27

∴ The MSE for the analysis would be 14.8

---

38. Answer: d

Explanation:

Formula

The spearman rank correlation coefficient = $r = 1 - (6\sum d^2)/n(n^2 - 1)$

Calculation

Judge 1(R_1)	Judge 2(R_2)	($R_1 - R_2$) = D	D^2
6	1	5	25
5	2	3	9
4	3	1	1
3	4	-1	1
2	5	-3	9
1	6	-5	25
Total			$\sum D^2 = 70$

According to the formula

$\Rightarrow r = 1 - [(6 \times 70)/6(6^2 - 1)]$

$\Rightarrow r = 1 - [(6 \times 70/210]$

$\Rightarrow r = 1 - 6/3$

$\therefore$ Spearman rank correlation coefficient r is - 1

---

39. Answer: b

Explanation:

Given

F = 1.5

SST = 18

N = 3

Formula

Total mean square = SST/(N - 1)

SST = Total sum of squares

N = number of observations

Calculation

Total mean square = 18/(3 - 1)

⇒ Total mean square = 18/2

⇒ Total mean square = 9

∴ Mean sdquare between classes is 9/3 = 3

---

40. **Answer: a**

Explanation:

Explanation

The standard deviation of whose batsman is less will be more more consistent

The standard deviation of A is least

∴ The A is the most consistent

41. **Answer: a**

Explanation:

Explanation

The residual or error is given by the ratio of sum of square due to error to the number of degree of freedom of freedom for residual

∴ MSE = SSE/(p - 1)(q - 1)

⭐ Important Points

MSE = Variance within the sample

SSE = Sum of squares of the error

42. **Answer: c**

Explanation:

Explanation

The simplest device for ascertaining whether two variables are related is to prepare a dot chart called scatter diagram. When this method is used the given data are plotted on a graph paper in the form of dots.

∴ If a data set contains n paired values on two variables x(independent) and y(dependent), then their plot is called Scatter diagram

43. **Answer: d**

Explanation:

Formula

Degree of freedom = (k - 1), k(c - 1)

Calculation

Here, k = 5, c = 20

⇒ The degree of freedom associated within F = (5 - 1), 5(20 - 1)

⇒ 4, 95

∴ The degree of freedom associated with F is 4, 95

---

44. Answer: b

Explanation:

Explanation

Secondary data = Secondary data is data collected by any party other than the researcher, including administrative data from programs, geodata from specialized sources, and census or other population data from governments.

∴ The data taken from the publication "sankhya" will be considered as Secondary data

---

45. Answer: a

Explanation:

Formula

If θ be the angle between the regression lines then,

$\text{Tan } \theta = [(1 - r^2)/r] \times (\sigma_x \times \sigma_y)/(\sigma_x^2 + \sigma_y^2)$

Explanation

According to question

$\Rightarrow \sigma_x = \sigma_y$

$\Rightarrow Tan\theta = [(1 - r^2/r] \times (\sigma_x^2/(2\sigma_x)$

$\Rightarrow Tan\theta = [(1 - r^2/r] \times 1/2$

$\Rightarrow Tan\ \theta = (1 - r^2/2r$

$\Rightarrow Tan\theta = Sin\theta/cos\theta$

$\Rightarrow Tan\theta = Sin\theta \times cos\theta$

$\Rightarrow Sin\theta = Tan\theta\ /sec\theta$

$\Rightarrow Sin\theta = Tan\theta/\sqrt{(1 + tan^2\theta)}$

$\Rightarrow Sin\theta = [(1 - r^2/r]/\sqrt{(1 + (1 - r^2/2r)^2)}$

$\Rightarrow Sin\theta = (1 - r^2)/\sqrt{[(1 - r^2)^2 + 4r^2]}$

$\therefore\ sin\theta = \sqrt{\frac{1 - r_{xy}^2}{1 + r_{xy}^2}}$

---

46. Answer: a

Explanation:

Explanation

The statement which is wrong about the variation is Chance causes variations are preventable

---

47. **Answer: d**

Explanation:

Explanation

The factor means for factor (F) = MST/MSE

⭐ Important Points

Where as, MTS = Mean total sum of square

MSE = Mean sum of squares

---

48. **Answer: d**

Explanation:

Explanation

Kurtosis means "bulginess". Kurtosis refers to the degree of flatness or peakedness in the region about the mode of frequency curve. The degree of kurtosis of a distribution is measured relative to the peakedness of normal curve. In other words measures of kurtosis tell us the extent to which a distribution is more peaked or flat topped than the normal curve

∴ This feature of the frequency distributions in which they are different are called kurtosis

---

49. **Answer: d**

Explanation:

Explanation

The object of the F- test is to find out whether the two independent estimates of population variance differ significantly or whether the two samples may be regarded is drawn from the normal populations having the same variance

∴ In ANOVA for testing the equality of group means, one conducts F- test

---

50. Answer: d

Explanation:

Given

$P(A \cap B) = 1/2$,

$P(A^c \cap B^c) = 1/2$

$2P(A) = P(B) = p$

Formula

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Calculation

According to the question

$\Rightarrow P(A \cup B) = p/2 + p - 1/2$

$\Rightarrow P(A \cup B) = 3p/2 - 1/2$

$\Rightarrow P(A \cup B) = 1 - P(A^c \cap B^c)$

$\Rightarrow P(A^c \cap B^c) = 1 - 1/2$

$\Rightarrow P(A^c \cap B^c) = 1/2$

$\Rightarrow 3p/2 - 1/2 = 1/2$

$\Rightarrow 3p/2 = 1$

∴ The value of p is 2/3

---

51. Answer: b

Explanation:

Explanation

Seasonal indices = Seasonal variation is measured in terms of an index, called a seasonal index. It is an average that can be used to compare an actual observation relative to what it would be if there were no seasonal variation. An index value is attached to each period of the time series within a year.

∴ Ratio to trend method for seasonal indices provide good results if:the periods are of short duration

---

52. Answer: c

Explanation:

Formula

Average = sum of observation/number of observations

Calculation

Let the total age of 25 students be y months and average be x months

⇒ x = y/25 ------(i)

Now 1 student aged 22years or 22 × 12 months is replaced by student of λ years

The average of the 25 students decreases by 3 months then,

⇒ x - 3 = (y - 22 × 12 + λ)/25

$\Rightarrow x = 3 + (y - 22 \times 12 + \lambda)/25$ ------(ii)

From eq (i) and (ii) we get,

$\Rightarrow y/25 = 3 + (y - 22 \times 12 + \lambda)/25$

$\Rightarrow y = 75 + y - 264 + \lambda$

$\Rightarrow \lambda = 189$ months

$\therefore$ The age of new student is 15 years 9 months

---

53. Answer: a

Explanation:

Explanation

When we ignore residual errors in performing ANOVA then SSE will definitely increases

---

54. Answer: a

Explanation:

Formula

The yearly trend equation is in form of

$y = a + bx$

Then monthly trend line is obtained by dividing a by 12 and b by 144

Calculation

The yearly trend equation = $y = 148.8 + 7.2x$

⇒ The monthly line equation = y = 148.8/12 + 7.2y/144

∴ The monthly equation line is Y = 12.4 + 0.05X

---

55. Answer: c

Explanation:

Given

P(A 1) = 1 / 3,

P(A 2) = 1 / 4

P(A 3) = 2 / 5

Calculation

If $P(A_1) = 1/3$

⇒ $P(\bar{A}_1) = 1 - 1/3 = 2/3$

⇒ $P(\bar{A}_2) = 1 - 1/4 = 3/4$

⇒ $P(\bar{A}_3) = 1 - 2/5 = 3/5$

Now the probability that exactly one of the events occur = P(A 1) × P(Ā 2) × P(Ā 3) + P(Ā 1) × P(A 2) × P(Ā 3) + P(Ā 1) × P(Ā 2) × P(A 3)

⇒ 1/3 × 3/4 × 3/5 + 2/3 × 1/4 × 3/5 + 2/3 × 3/4 × 2/5

⇒ 3/20 + 2/20 + 4/20

∴The probability that exactly one of the events occur is 9/20

---

56. Answer: c

Explanation:

Given

the trend line with 2008 as origin is Y = 20.6 + 1.68X

Calculation

When we take 2004 as the origin then we go down by (2008 - 2004) = 4 years

⇒ y = 20.6 + 1.68(x - 4)

⇒ y = 20.6 + 1.68x - 6.72

⇒ y = 13.88 + 1.68

∴ the trend line with 2004 as origin is y = 13.88 + 1.68

---

57. **Answer: a**

Explanation:

Explanation

The first central moment about mean is Zero

Second Central moment is the variance.

Second and Central Moments are needed to find skewness.

Second and fourth central moments are needed to find the kurtosis.

∴ Option 1 is wrong statement so option 1 is answer

---

58. **Answer: b**

Explanation:

Formula

The equation of exponential trend line is given by

$y = ab^x$

Calculation

The exponential trend is given by

$\Rightarrow y = 20 \times (1.5)^x$

When shift the origin from 2004 to 2006 then

$\Rightarrow y = 20 \times (1.5)^{(X+2)}$

$\Rightarrow y = 20 \times (1.5)^x \times (1.5)^2$

$\Rightarrow y = 20 \times (1.5)^x \times 2.25$

∴ The equation of the exponential trend with 2006 as origin is: $y = 45(1.5)^x$

---

59. **Answer: a**

Explanation:

Calculation

Total number of shoes = 16

8 are from the left leg and 8 from the right leg

When we select 4 shoes at random

Total number of ways of choosing shoes = $^{16}c_4$

Probability of choosing shoes are all of right leg or left leg = $[2 \times {}^{8}c_4]/[{}^{16}c_4]$

$\Rightarrow [2 \times 8!/4! \times 4!]/16!/4! \times 12!]$

$\Rightarrow [2 \times 8!/4! \times 4!]/12! \times 4!/16!]$

$\Rightarrow 2 \times 8! \times 12!/4! \times 16!]$

$\Rightarrow (2 \times 8 \times 7 \times 6 \times 5 \times 4! \times 12!)/(4! \times 16 \times 15 \times 14 \times 13 \times 12!)$

∴ The required probability is 1/13.

---

60. Answer: a

Explanation:

Explanation

Seasonal variations are those periodic movements in business activities which occur regularly every year and have their origin their origin in the nature of the year itself. The variations repeat during a period of 12 months.

The term cyclic refers to the recurrent variations in time series that usually last longer than a year and are regular neither in amplitude nor in length

∴ First option is correct one

---

61. Answer: a

Explanation:

Explanation

Secular trends refers to the general tendency of the data to grow or decline over a long period of time

∴ First option is correct answer

---

62. **Answer: c**

Explanation:

Formula

Mean = ∑fx/∑f

Calculation

Interval	Mid – point (x)	Frequency (f)	Fx
10 – 20	15	8	120
20 – 30	25	20	500
30 – 40	35	16	560
40 – 50	45	24	1080
50 – 60	55	12	660
60 – 70	65	4	260
Total		84	3180

⇒ Mean = 3180/84

∴ The Mean is 37.86 (approx)

---

63. Answer: d

Explanation:

Explanation

The ratio to trend method = [Original data/Trend data] × 100

The seasonal indices are calculated using the following formula

⇒ [Quarterly Average/General Averages] × 100

∴ We multiply 1 so that we computed seasonal indices from ratio to trend method

---

64. Answer: d

Explanation:

Explanation

According to the question, $P(A \cup B) = 1$

$\therefore P(A \cap B) = P(A).P(B)$

$\therefore P(A \cap B)$ is $0.5 \times 0.5 = 0.25$

---

65. Answer: c

Explanation:

Explanation

In second degree trend equation when the differences are taken of the first differences, the result obtained is a constant or nearly constant

∴ Differences should be used twice

---

66. Answer: b

Explanation:

Formula

Kurtosis = μ_4/μ_2^2

$\mu_4 = \sum(x_i - \bar{x})^4/n$

$\mu_2 = \sum(x_i - \bar{x})^2/n$

Calculation

Mean = $(-1 + 1 + 4)/4$

⇒ Mean = 1

⇒ $\mu_4 = [(-1 -1)^4 + (-1 - 0)^4 + (1 - 1)^4 + (4 - 1)^4]/4$

⇒ $[16 + 1 + 81]/4$

⇒ $\mu_4 = 98/4$

⇒ $\mu_2 = [(1 - 1)^2 + (-1 - 0)^2 + (1 - 1)^2 + (4 - 1)^2]/4$

⇒ $\mu_2 = [4 + 1 + 9]/4$

⇒ $\mu_2 = 14/4$

⇒ $\mu 2 = (14/4)^2$

⇒ Kurtosis = $98/4/(14/4)^2$

⇒ $98/4 \times 16/196$

∴ **The value of kurtosis is 2**

---

67. Answer: a

Explanation:

Explanation

The multiplicative model of time series: $X_t = T_t \times S_t \times C_t \times I_t$

⇒ T_t, S_t, C_t, I_t are a trend, seasonal, cyclical, and irregular components

∴ **I_t is an irregular component chosen randomly positive quantity**

---

68. Answer: d

Explanation:

Calculation

According to the question A and B are independent event

⇒ $P(A \cap B) = P(A) \times P(B)$

⇒ $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

⇒ $P(A \cup B) = P(A) + P(B) - P(A) \times P(B)$

⇒ $0.7 = 0.4 + p - 0.4p$

⇒ $p - 0.4p = 0.7 - 0.4$

⇒ $0.6p = 0.3$

∴ p is 0.5

---

69. **Answer: d**

Explanation:

Calculation

Year	Y	X	XY	X^2
1990	5	-2	-10	4
1991	7	-1	-7	1
1992	3	0	0	0
1993	6	1	6	1
1994	9	2	18	4
Total	30	0	7	10

⇒ ∑ = ∑Y/N

⇒ 30/5 = 6

∴ Fitting a straight-line, is the trend value for the year 1992 is 6

---

70. **Answer: c**

Explanation:

Formula

Mean - Mode = 3(Mean - Median)

Calculation

26.8 - Mode = 3(26.8 - 27.9)

⇒ Mode = 26.8 + 3.3

∴ The value of Mode is 30.1

---

71. **Answer: c**

Explanation:

Explanation

From the ratio - to - trend method we can estimated seasonal index

∴ Option 3 is correct answer

---

72. **Answer: b**

Explanation:

Given

The probability of getting plumbing contract = P(A) = 2/3

Probability of getting not electric contract $P(\bar{B})$ = 5/9

Probability of getting atleast one contract $P(A \cup B) = 4/5$

Calculation

The probability of not getting electric contract = $1 - P(\bar{B})$

$\Rightarrow = 1 - 5/9 = 4/9$

Probability of getting both the contracts $P(A \cap B) = P(A) + P(B) - P(A \cup B)$

$\Rightarrow P(A \cap B) = 2/3 + 4/9 - 4/5$

$\Rightarrow (90 + 60 - 108)/135$

$\therefore$ The probability that he will get both the contracts $P(A \cap B)$ is 14/45

---

73. Answer: a

Explanation:

Explanation

Year		Value in lakh tons
1998	a	30
1999	b	35
2000	c	25
2001	d	42
2002	e	62

Using moving average method the three means will be

⇒ (a + b + c)/3, (b + c + d)/3, (c + d + e)/3

⇒ (30 + 35 + 25)/3, (35 + 25 + 42)/3, (25 + 42 + 62)/3

⇒ 90/3, 102/3, 129/3

∴ The three year moving average is 30, 34, 43

---

74. Answer: a

Explanation:

Calculation

Year	Actual values	Deviations from 2003 (x)	Trend values Y = 89 + 2x	Trend eliminated value
2000	77	-3	89 + 2(-3) = 83	77 ÷ 83 = 0.93
2001	88	-2	89 + 2 (-2) = 85	88 ÷ 85 = 1.04
2002	94	-1	89 + 2(-1) = 87	94 ÷ 87 = 1.08
2003	85	0	89 + 2(0) = 89	85 ÷ 89 = 0.96
2004	91	1	89 + 2(1) = 91	91 ÷ 91 = 1
2005	98	2	89 + 2(2) = 93	98 ÷ 93 = 1.05
2006	90	3	89 + 2(3) = 95	90 ÷ 95 = 0.95

∴ The trend eliminated values are 0.93, 1.04, 1.08, 0.96, 1.0, 1.05, 0.95

---

75. **Answer: c**

Explanation:

Explanation

A and B are independent events

$\Rightarrow P(A \cap B) = P(A) \times P(B)$

According to question

$\Rightarrow P(A) \times P(B) = 0.16$

$\Rightarrow P(A') \times P(B') = 0.36$ ----(I)

$\Rightarrow [(1 - P(A)\} \times \{1 - P(B)\} = 0.36$ ----(ii)

From both eq (I) and (ii) we get

P(A) and P(B) = 0.8

By option elimination we can conclude

P(A) = 0.4 and P(B) = 0.4

---

76. **Answer: a**

Explanation:

Explanation

Only trend can be checked by the link relatives in the time series

∴ Option 1 is correct

---

77. **Answer: b**

Explanation:

Calculation

Annual production of motor cyle = 1.80 lakh

⇒ 90° = 1.80

⇒ 1° = 0.02

⇒ 120° = 2.4 lacs

∴ The annual production of Bicycle is 2.4 lacs

---

78. Answer: b

Explanation:

Given

$P(E) > 0$,

$P(F|E) = 0.3$

$P(E \cap F^c) = 0.2$

Calculation

$P(F/E) = P(E \cap F)/P(E)$

$\Rightarrow P(F/E) = \{P(E) - P(E \cap F')\}/P(E)$

$\Rightarrow 0.3 = P(E) - 0.2\}/P(E)$

$\Rightarrow 0.3 = 1 - 0.2/P(E)$

$\Rightarrow 0.2/P(E) = 1 - 0.3$

$\Rightarrow 0.2/P(E) = 0.7$

∴ The value of P(E) is 2/7

---

79. **Answer: d**

Explanation:

Given

Trend equation line = 26y = 5335 + 624t

Calculation

Trend equation line = 26y = 5335 + 624t

⇒ y = 5335/26 + 624t/26

This equation is in the form of y = a + bt

The monthly rise in the production = b/12

∴ The monthly increase in production of fertilisers (in kg) is 624/26 × 12 = 2

---

80. **Answer: c**

Explanation:

Concept:

Let $E_1, E_2, \ldots, E_n$ be a set of events associated with a sample space S, where all the events $E_1, E_2, \ldots, E_n$ have a nonzero probability of occurrence and they form a partition of S. Let A be any event associated with S, then according to Bayes theorem,

$$P(E_i/A) = \frac{P(E_i)P(A/E_i)}{\sum_{k=1}^{n} P(E_k)P(A/E_k)}$$

for any k = 1, 2, 3, ..., n

Calculation:

Let A_i (i = 2, 3, 4, 5) be the event that urn contains 2, 3, 4, 5 white balls and let B be the event that two white balls have been drawn then we have to find P (A_5/B).

Since the four events A_2, A_3, A_4 and A_5 are equally likely we have

P (A_2) = P (A_3) = P (A_4) = P(A_5) = $\frac{1}{4}$

P(B/A_2) is probability of event that the urn contains 2 white balls and both have been drawn.

$P(B/A_2) = \frac{^2C_2}{^5C_2} = \frac{1}{10}$

Similarly, $P(B/A_3) = \frac{^3C_2}{^5C_2} = \frac{3}{10}$,

$P(B/A_4) = \frac{^4C_2}{^5C_2} = \frac{3}{5}$,

$P(B/A_5) = \frac{^5C_2}{^5C_2} = 1$

By Bayes' theorem,

$P(A_5/B) = \frac{P(A_5)P(B/A_5)}{P(A_2)P(B/A_2)+P(A_3)P(B/A_3)+P(A_4)P(B/A_4)+P(A_5)P(B/A_5)}$

⇒ P(A_5/B)= $\frac{\frac{1}{4}.1}{\frac{1}{4}\left[\frac{1}{10}+\frac{3}{10}+\frac{3}{5}+1\right]} = \frac{10}{20} = \frac{1}{2}$

∴ The required probability is $\frac{1}{2}$.

---

81. Answer: d

Explanation:

Formula

q_1 = (q o × 10q o/100

P_o= Price of commodity in the base year

P_1= price of commodity in the current year

Q_o= quantity of commodity purchased in base year

Calculation

$q_1 = o.9q_o$

We know that

$\Rightarrow I_l = (\sum p_1 q_o / \sum p_o q_o) \times 100$ ------(i)

$\Rightarrow I_p = (\sum p_1 q_1 / \sum p_o q_1) \times 100$

$\Rightarrow I_p = 0.9 \times \sum p_1 q / \sum p o_q 1 \times 100$ ------(ii)

On dividing equation (i) and (ii) we get

$P_l / I_p = 1$

$\therefore I_L = P_P$

---

82. Answer: c

Explanation:

Given

Standard deviation $\sigma = 5$

Concept

For mesokurtic $\beta_2 = 3$

Calculation

$\beta_2 = \mu_4 / \mu_2^2$

$\Rightarrow \mu_4 / \sigma^4 = 3$ (μ_2 = variance = σ^2)

$\Rightarrow \mu_4/5^4 = 3$

$\Rightarrow \mu_4 = 625 \times 3$

∴ The value of fourth moment is 1875

---

83. Answer: d

Explanation:

Explanation

The purchasing power of money = 1/cost of living index

∴ The purchasing power of money is proportional to I

⭐ Key Points

The purchasing power of money = It refers to a real value of a rupee. The purchasing power is the value of a currency expressed in terms of the amount of goods or services that one unit of money can buy

---

84. Answer: b

Explanation:

Explanation

Base shifting = For a variety of reasons, it frequently becomes necessary to change the reference base of an index number series from one time to another without returning to the original raw data and recomputing the entire series. This change of reference base period is usually referred to as "shifting the base

Splicing = Splicing of index numbers mean s converting the two, or more series of index numbers of different bases into a continuous series of index numbers of a

common base

Deflating = The word deflating is the verbal form of the word 'deflation' which is just opposite to the word inflation. Thus, deflating means counteracting the effect of inflation over a set of data to unravel their true values and make them comparable.

∴ Splicing is correct answer

---

85. Answer: b

Explanation:

Explanation

The time reversal test is a test to determine whether a given method will work both ways in time, forward and backward. In other words of professor I. Fisher "The test is that for formula for calculating the index number should be such that it will give the same ratio between one point of comparison and the other, no matter which of the two is taken as base.

∴ This tese is Time reversal test

⭐ **Key Points**

Unit test = This test requires that an index number formula should be such that it does not affect the value of the index number, even if, the units of the price or quantities quoted are altered. This test is satisfied by all the index formulas.

Circular test = Another test of the adequacy of the index number formula is what is known as the 'circular test'. If in the use of index numbers interest attaches not merely to a comparison of two years, but to the measurement of price changes over a period of years. It is frequently desirable to shift the base.

Factor Reversal Test = The factor reversal test requires that multiplying a price index and a volume index of the same type should be equal to the proportionate change in the current values (e.g. the “Fisher Ideal” price and volume indexes satisfy this test, unlike either the Paasche or Laspeyres indexes)

86. **Answer: d**

Explanation:

Given

$P(S \cap T) = 6 / 25$

$P(S|T) + P(T|S) = 1$

Where, $P(S) < P(T)$

Formula

$P(S/T) + P(T/S) = 1$

Calculation

$P(S/T) = P(S \cap T)/P(T)$

$P(T/S) = P(T \cap S)/P(S)$

$\Rightarrow P(S \cap T)/P(T) + P(T \cap S)/P(S) = 1$

$\Rightarrow P(S \cap T)[P(T) + P(S)][/P(T) \times P(S)] = 1$

$\Rightarrow 6/25[[1/P(S)] = 1$

$\Rightarrow P(S) < P(T)$

So by good approximation

$\therefore$ P(S) is 2/5

87. **Answer: d**

Explanation:

Formula

Average = sum of observation/total number of observations

Calculation

Let the uniform wages of 9 workers be Rs. x per worker

Total wages of 9 workers = 9x

After adding 10th worker whose wage is 20 less than the other then total wages of all 10 workers

⇒ 10x - 20

⇒ Average wages = (10x - 20)/10 = x - 2

∴ **The new average wage is Rs. 2 less than the previous wages of Rs.x**

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88. Answer: a

Explanation:

Explanation

If the price and quantity of commodities are decreasing or increasing in a same ratio then both index ratio will be same

∴ $\frac{L(p)}{L(q)} = \frac{P(p)}{P(q)}$ **is correct answer**

⭐ **Key Points**

Laspeyres price index = $(\sum p_1 q_o / \sum p_0 q_0) \times 100$

P_1 = current year

P_0 = base year

q_0 = base quantity

The general formula for Paasche's index number is

$P_{01} = [\sum p_1 q_1 / \sum p_o q_1]$

P_1= Price in current year

q_1= quantity in current year

p_o= price in base year

q_0= quantity in base year

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89. **Answer: b**

Explanation:

Given

f(x) = k.|x|, if x = - 2, 1, 3

0 otherwise

Formula

variance = $E(x^2) - (E(x))^2$

Concept

Total probability = 1

Calculation

$\mathop \sum \limits_{x = \; - 2} f\left(x \right) + \;\mathop \sum \limits_{x = 1} f\left(x \right) + \;\mathop \sum \limits_{x = 3} f\left(x \right) = 1$

⇒ $k\mathop \sum \limits_{x = \; - 2} \left| X \right| + \;k\mathop \sum \limits_{x = 1} \left| X \right| + \;k\mathop \sum \limits_{x = 3} \left| X \right| = 1$

⇒ k|-2| + k|1| + k|3| = 1

⇒ 2k + k + 3k = 1

⇒ k = 1/6

We know that

Var x = E(x 2) - (E(x)) ^{2}

E(x) = ∑xf(x)

⇒ E(x) = \(\mathop ∑ \limits_{x = \; - 2} xf\left(x \right) + \;\mathop ∑ \limits_{x = 1} xf\left(x \right) + \;\mathop ∑ \limits_{x = 3} xf\left(x \right) \)

⇒ E(x) = \(1/6\mathop ∑ \limits_{x = \; - 2} x\left| x \right| + \;1/6\mathop ∑ \limits_{x = 1} x\left| x \right| + \;1/6\mathop ∑ \limits_{x = 3} x\left| x \right| \)

⇒ E(x) = 1/6[-2 × 2 + 1 × 1 + 3 × 3]

⇒ E(x) = 1/6[6]

⇒ E(x) = 1

Now E(x ^{2}) = ∑x ^{2}f(x)

⇒ E(x 2) = \(\mathop \sum \limits_{x = \; - 2} \) x^2 f(x) + \(\mathop \sum \limits_{x = \; 1}\) x^2 f(x) + \(\mathop \sum \limits_{x = \; 3}\) x^2 f(x)

⇒ E(x 2) =1/6[\(\mathop \sum \limits_{x = \; -2}\) x^2 |x| + \(\mathop \sum \limits_{x = \; 1}\) x^2 |x| + \(\mathop \sum \limits_{x = \; 3}\) x^2 |x|

⇒ E(x 2) = 1/6[(-2) ^{2} × 2 + 1 ^{2} × 1 + 3 ^{2} × 3]

⇒ E(x 2) = 1/6(8 + 1 + 27) = 6

⇒ Variance = 6 - (1) ^{2}

∴ **Variance is 5**

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90. Answer: a

Explanation:

Given

Mean = 32

Median = 30

Formula

Mode = 3 × median - 2 × mean

Calculation

Mode = 3 × 30 - 2 × 32

∴ Mode = 26

Here Mode is least and median is lies between mean and mode

∴ Mean > Median > Mode

∴ This relation satisfied Positive skewed

⭐ Key Points

Relation of mean, mode, and median for positive skewness is Mean > Median > Mode

Relation of mean, mode, and median for negative skewness is Mode > Median > Mean

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91. Answer: b

Explanation:

Given

m = 4

Formula

The probability distribution is given by

$p(x) = (e^{-m} \times m^{x})/x!$

Calculation

According to the formula

$\Rightarrow p(x0 = (e^{-4} \times 4^{x})/x!$

Now the probability that in a given month there will be less than 4 acc idents

$\Rightarrow P(0) + P(1) + P(2) + P(3)$

$\Rightarrow$ \(\mathop \sum \limits_{x = 0}^{x = 3} \) $e^{-4}\ 4^{x}/x! = e^{-4}[1 + 4 + 8 + 32/3]$

$\Rightarrow 0.0183 \times [13 + 32/3$

$\Rightarrow 0.0183 \times 71/3$

∴ The probability that in a given month there will be less than 4 accidents is 0.4331

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92. Answer: b

Explanation:

Explanation

For frequency distribution of a discrete variable, the diagram of less than type cumulative frequency is non decreasing step function

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93. Answer: d

Explanation:

Given

$f(x) = \begin{cases} 3x^2, & 0 \le x \le 1 \\ 0, & \text{elsewhere} \end{cases}$

Calculation

$P(X < a) = 1/a^2 = \int_0^a f(x)dx = 1/2$

$\Rightarrow 3\int_0^a x^2 dx = 1/2$

$\Rightarrow 3[x^3/3]_0^a = 1/2$

$\Rightarrow 3 \times (a^3/3 - 0) = 1/2$

$\Rightarrow a^3 = 1/2$

∴ The value of a such that $P[x \le a] = P[x > a]$ is $(1/2)^{1/3}$

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94. **Answer: b**

Explanation:

Explanation

If skewness is negative , the mean is smaller than the median and the distribution has a large tail of small values.

The relation in mean, median and mode in positive skewed

Mean < Median < Mode

⭐ Key Points

Skewness: measure the asymmetry of a distribution about its peak;

It is a number that describes the shape of the distribution.

It is often approximated by Skew = (Mean - Median) / (Std dev).

If skewness is positive , the mean is bigger than the median and the distribution

The relation in mean, median and mode in positive skewed

Mean > Median > Mode

has a large tail of high values.

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95. Answer: c

Explanation:

Formula

In poisson distribution

$P(X = x) = e^{-\lambda} \lambda^{x}/x!$; $x = 0, 1, 2, 3, ------ \lambda > 0$

In Binomial distribution

$P(x) = {}^{n}c_{x} p^{x} q^{\lambda - x}$

Calculation

$P(xy = 0) = e^{-2} \times 2^{0}/0! + {}^{5}c_{0}(0.4)^{5} \times (0.6)^{0}$

$\Rightarrow e^{-2} \times 2^{0}/0! + 5c_{0}(0.4)^{5}$

$\Rightarrow e^{-2} + (0.4)^{5} - e^{-2} \times (0.4)^{5}$

∴ The P(xy = 0) equals to $e^{-2} + (0.4)^{5} - e^{-2} \times (0.4)^{5}$

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96. Answer: a

Explanation:

Given

Mean = 36

Standard deviation = 4

Calculation

The mean of [50 - (x/4)] = [50 - 36/4]

⇒ Mean of [50 - (x/4)] = 41

⇒ Standard deviation of [50 - (x/4)] = 4/4 = 1

∴ The value of Mean and standard deviation is 41 and 1

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97. Answer: d

Explanation:

Formula

$E(x/y = 1) = \sum x_j P(x = xy/y = 1$

Calculation

According to the formula

⇒ 1 × (0.4/0.3)

⇒ 4/3

∴ The E(x|y = 1) is: 4/3

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98. Answer: b

Explanation:

Calculation

Mean = $\bar{X} = \sum fx/N = 0/3 = 0$

X	f	fx	$X - \bar{X}$	$(X - \bar{X})^2$	$f.(X - \bar{X})^2$	$(X - \bar{X})^3$	$F(X - \bar{X})^3$
-k	3k	$-3k^2$	-k	K^2	$3k^3$	$-k_3$	$-3k^4$
0	2k	0	0	0	0	0	0
3k	k	$3k^2$	3k	$9k^2$	$9k^3$	$27k^3$	$27k^4$
Total	6k	0	2k		$12k^3$		$24k^4$

$\Rightarrow$ Mode = -k

$\Rightarrow \mu_2 = \sum f(X - \bar{X})^2/N = 12k^3/6k$

$\Rightarrow \mu_2 = 2k^2$

$\Rightarrow \mu_3 = \sum f(X - \bar{X})^3/N = 24k^4 6k$

$\Rightarrow \mu_3 = 4k^3$

Coefficient of skewness = $\beta_1 = \mu_3^2/\mu_2^3$

$\Rightarrow \beta_1 = 16k^6/8k^6$

$\therefore$ The coefficient of skewness β_1 is 2

99. **Answer: a**

Explanation:

Given

$f(x) = 1/\sqrt{2\pi}e^{-x2/2dx}$

Formula

$E(y) = \int_{-\infty}^{\infty} yf(x)dx$

Calculation

$E(y) = \int_{-\infty}^{\infty} yf(x)dx = \int_{-\infty}^{\infty} (x+1)1/\sqrt{2\pi}\,(e^{-x2/2dx}$

$\Rightarrow (1/\sqrt{2\pi}) \int_{-\infty}^{\infty} (x+1)\, e^{-x2/2dx}$

$\Rightarrow E(y) = (1/\sqrt{2\pi}) \int_{-\infty}^{\infty} x \times e^{-x2/2dx} + (1/\sqrt{2\pi}) \int_{-\infty}^{\infty} e^{-x2/2dx}$

$\Rightarrow$ Since, $x \times e^{-x2/2\,dx}$ is an odd function of k

$\therefore (1/2\sqrt{2\pi}) \int_{-\infty}^{\infty} e^{-x2/2dx} = 0$

$\Rightarrow E(y) = (1/2\sqrt{2\pi}) \int_{-\infty}^{\infty} e^{-x2/2dx}$

$\Rightarrow (1/\sqrt{2\pi}) \times \sqrt{2\pi} = 1$

Using the standard integrals we have

$\int_{-\infty}^{\infty} e^{-x2/2dx} = \sqrt{2\pi}$

100. **Answer: b**

Explanation:

Given

μ_r be the r th order central-moment of a population μ_0, μ_1 and μ_2 are moments aboput mean

Calculation

μ_o about mean = 0

$\Rightarrow \mu_1 = (\sum x - \bar{x})/N = 0$ (Sum of deviations of items from the arithmetic mean is always zero

$\Rightarrow \mu_2 = \sum(x - \bar{x})^2/N = \sum x^2/N = \sigma$

$\therefore$ **The value of μ_2 is σ**