MHT CET 2026 Mathematics Memory Based Question Paper PDF

Mathematics

1. Given $f(x) = x - 1$, $h(1) = 4$, and $h'(1) = -2$. If $g(x) = (f[4(h(x)) + 3])^2$, find the value of $g'(1)$.

   (A) -288
   (B) 288
   (C) -144
   (D) 144

2. The area in sq. units bounded by the curve $y = 2\sqrt{1 - x^2}$ and the x-axis is:

   (A) π
   (B) 2π
   (C) $\pi/2$
   (D) 4π

3. The objective function is $Z = 3x + 5y$. The difference between the maximum and minimum values of Z is $3a$, subject to constraints: $x + y \geq 1$, $5x + 10y \leq 50$, $x, y \geq 0$. Find the value of a.

   (A) 3
   (B) 6
   (C) 9
   (D) 27

4. The surrounding temperature is 20°C. A body cools from 100°C to 60°C in 20 minutes. Find the time taken for the body to cool down to 30°C.

   (A) 40 minutes
   (B) 50 minutes
   (C) 60 minutes
   (D) 80 minutes

5. For the parabola $y^2 = 16x$, find the distance between the focus and the directrix.

   (A) 2
   (B) 4
   (C) 8
   (D) 16

6. The lines $\vec{r} \times \vec{a} = \vec{b} \times \vec{a}$ and $\vec{r} \times \vec{b} = \vec{a} \times \vec{b}$ intersect at a point, where $\vec{a} = \hat{i} + \hat{j}$ and $\vec{b} = \hat{i} - \hat{k}$. Find the point of intersection.

   (A) $(2, 1, -1)$
   (B) $(1, 1, -1)$

(C) $(2, 0, -1)$

(D) $(1, 0, -1)$

7. The statement $\neg(p \leftrightarrow q)$ is logically equivalent to:

(A) $\neg p \leftrightarrow \neg q$

(B) $\neg p \rightarrow q$

(C) $\neg(p \rightarrow \neg q)$

(D) $p \leftrightarrow \neg q$

8. If $A = \begin{bmatrix} \sec\theta & -\tan\theta \\ -\tan\theta & \sec\theta \end{bmatrix}$ and $A + \text{adj}A = 4I$, then find the value of θ.

(A) $\frac{\pi}{6}$

(B) $\frac{\pi}{4}$

(C) 0

(D) $\frac{\pi}{3}$

9. Let $f(x) = \sqrt{x^2+1}$, $g(x) = \frac{x+1}{x^2+1}$, $h(x) = 2x - 3$. Then, $f'(h'(g'(x))) = ?$

(A) $\frac{2}{\sqrt{5}}$

(B) $-\frac{2}{\sqrt{5}}$

(C) 0

(D) $\frac{1}{\sqrt{5}}$

10. Evaluate:

$$\int \frac{x+1}{x(1+xe^x)^2}\,dx$$

(A) $\ln\left|\frac{xe^x}{1+xe^x}\right| + \frac{1}{1+xe^x} + C$

(B) $\ln|xe^x| - \ln|1+xe^x| - \frac{1}{1+xe^x} + C$

(C) $\ln\left|\frac{1+xe^x}{xe^x}\right| + \frac{1}{1+xe^x} + C$

(D) $\frac{1}{1+xe^x} + C$