MHT CET 2026 Mathematics Memory Based Question Paper PDF

Mathematics

1. If $\sin x \cos x = \frac{1}{4}$, then the general solution is:

   (A) $\frac{n\pi}{2} + (-1)^n \frac{\pi}{12}$
   (B) $\frac{n\pi}{2} + \frac{\pi}{4}$
   (C) $n\pi \pm \frac{\pi}{6}$
   (D) $\frac{n\pi}{2} + (-1)^n \frac{\pi}{6}$

2. If $n \in \mathbb{Z}$, then the expression

$$\frac{2^n}{(1-i)^{2n}} + \frac{(1+i)^{2n}}{2^n}$$

   is equal to:

   (A) $2(-1)^n$
   (B) 0
   (C) 2
   (D) 2^n

3. The value of

$$\int \frac{x^2 - 1}{(x^4 + 3x^2 + 1)\tan^{-1}\left(x + \frac{1}{x}\right)}\, dx$$

   is:

   (A) $\log\left|\tan^{-1}\left(x + \frac{1}{x}\right)\right| + C$
   (B) $\tan^{-1}\left(x + \frac{1}{x}\right) + C$
   (C) $-\log\left|\tan^{-1}\left(x + \frac{1}{x}\right)\right| + C$
   (D) $\frac{1}{2}\log\left|x + \frac{1}{x}\right| + C$

4. If

$$f(x) = \int \frac{x^2}{(1-x^2)(1+\sqrt{1-x^2})}\, dx$$

   and $f(0) = 2$, then $f\left(\frac{1}{2}\right)$ is:

   (A) $2 + \frac{1}{2}\log 3 - \frac{\sqrt{3}}{2}$
   (B) $2 + \log 3 - \sqrt{3}$
   (C) $2 + \sqrt{3} - \log 3$
   (D) $2 + \frac{\sqrt{3}}{2} - \frac{1}{2}\log 3$

5. If

$$A = \begin{bmatrix} \sin\alpha & -\cos\alpha \\ \cos\alpha & \sin\alpha \end{bmatrix}$$

   and $\alpha \in \left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$. If $A + A^T = I$, then $\alpha =$

(A) $\frac{2\pi}{3}$
(B) $\frac{5\pi}{6}$
(C) $\frac{\pi}{3}$
(D) $\frac{4\pi}{3}$

6. The range of the function

$$y = \log(\sin x)$$

where $\sin x > 0$ is:

(A) $[0, \infty)$
(B) $(-\infty, 0]$
(C) $(-\infty, \infty)$
(D) $[-1, 1]$

7. Let $f(x)$ be defined by:

$$f(x) = \begin{cases} \int_x^6 (|t-2|+3)\,dt, & x > 4 \\ 2x + 8, & x \leq 4 \end{cases}$$

Then at $x = 4$, $f(x)$ is:

(A) Continuous but not differentiable
(B) Differentiable
(C) Discontinuous
(D) None of these

8. If

$$y = (x-1)(x-2)(x-3)\cdots(x-100)$$

and the value of $\frac{dy}{dx}$ at $x = 0$ is equal to

$$\lambda\left(\frac{100!}{{}^{100}C_5}\right)$$

then λ is:

(A) $\frac{1}{120}$
(B) 120
(C) 1
(D) $\frac{1}{24}$

9. If a vector $\vec{c}$ is coplanar with $\vec{a}$ and $\vec{b}$ such that

$$\vec{c}\cdot\vec{a} = 1 \quad \text{and} \quad \vec{c}\cdot\vec{b} = 2$$

where $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{b} = \hat{i} - \hat{j} + 2\hat{k}$, then $\vec{c}$ is:

(A) $\frac{1}{3}(-\hat{i} + 5\hat{j} + 3\hat{k})$
(B) $\frac{1}{3}(5\hat{i} - \hat{j} + 3\hat{k})$
(C) $\hat{i} - \hat{j} + \hat{k}$
(D) $\frac{1}{2}(\hat{j} + \hat{k})$

10. If n is an odd natural number and

$$I_n = \int_0^1 e^x (x-1)^n\,dx$$

then $I_n + nI_{n-1}$ is equal to:

(A) 1
(B) -1
(C) e
(D) 0