Solution - Mathematics MCQs

Mathematics MCQs for A-Level, FSc, Class 11, 12 students OR
Mathematics MCQs for Engineering Universities Admission Test

1. $\sqrt{-3} \times \sqrt{-3} = ?$
(A) 3
(B) -3
(C) $3i$
(D) $-3i$
(E) None of these

Solution:

We can write $\sqrt{-3} = \sqrt{3}i$ Hence, $\sqrt{3}i \times \sqrt{3}i = 3i^2 = 3(-1) = -3$
Answer is: -3

2. $\dfrac{d}{dx} b^x = ?$

(A) b^x
(B) bx
(C) $b^x \ln b$
(D) $b^x \ln x$
(E) $b^x x \ln x$

Solution:

Remember: $\dfrac{d}{dx} a^x = a^x \ln a$ Hence, $\dfrac{d}{dx} b^x = b^x \ln a$ Answer

3. If $A = \begin{bmatrix} a & -b \\ c & d \end{bmatrix}$ Then $A^{-1} = ?$

(A) $ad - bc$
(B) $ad + bc$
(C) $\dfrac{1}{ad - bc} \begin{bmatrix} a & b \\ -c & d \end{bmatrix}$
(D) $\dfrac{1}{ad - bc} \begin{bmatrix} d & b \\ -c & a \end{bmatrix}$
(E) $\dfrac{1}{ad + bc} \begin{bmatrix} d & b \\ -c & a \end{bmatrix}$

Solution:

Remember, if $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ Then its inverse is: $A^{-1} = \dfrac{1}{ad-bc}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$

Hence, $A^{-1} = \dfrac{1}{ad+bc}\begin{bmatrix} d & b \\ -c & a \end{bmatrix}$ Answer

4. If $\displaystyle\int_{\frac{\pi}{2}}^{a} \sin x\, dx = \dfrac{1}{2}$ Then $a = ?$

(A) 0

(B) 1

(C) π

(D) $-\dfrac{\pi}{2}$

(E) $-\dfrac{\pi}{3}$

Solution:

$\displaystyle\int_{\frac{\pi}{2}}^{a} \sin x\, dx = -\cos x \Big|_{\frac{\pi}{2}}^{a} = -\cos a + \cos\dfrac{\pi}{2} = -\cos a + 0 = -\cos a = \dfrac{1}{2}$ OR $\cos a = -\dfrac{1}{2}$

Hence, $a = -\dfrac{\pi}{3}$ Answer

5. Find the values of x and y from the following equations:

$3x - 2y = 4$

$x + y = 2$

(A) $x = 2$ and $y = 4$

(B) $x = 4$ and $y = 6$

(C) $x = \dfrac{3}{2}$ and $y = \dfrac{2}{3}$

(D) $x = \dfrac{8}{5}$ and $y = \dfrac{2}{5}$

(E) $x = \dfrac{4}{3}$ and $y = \dfrac{3}{5}$

Solution:

$3x - 2y = 4$

$x + y = 2$

Multiply eq:2 with 3.

$3x - 2y = 4$

$\underline{-3x \pm 3y = -6}$

$-5y = -2$

$5y = 2$

$y = \dfrac{2}{5}$

Now put value of y in eq:2, $x + y = 2$

$x + \dfrac{2}{5} = 2$

$x = \dfrac{8}{5}$

Hence, answer is (D).

6. If $f(x) = \dfrac{x+2}{3}$ Then $f^{-1}(x) = ?$

(A) $3x - 2$

(B) $2x - 3$

(C) $\dfrac{3}{x+2}$

(D) Does not exist

(E) None of these

Solution:

$f(x) = \dfrac{x+2}{3}$

Step.1 Replace $f(x)$ by y

$y = \dfrac{x+2}{3}$

Step.2 Replace y with x, and x with y

$x = \dfrac{y+2}{3}$

Step.3 Solve for y.

$y + 2 = 3x$

$y = 3x - 2$

Step.4 Replace y by $f^{-1}(x)$

$f^{-1}(x) = 3x - 2$ Answer

7. Matrix A has 4 rows and 3 columns, and Matrix B has 5 rows and 2 columns. The Matrix AB will have?

(A) 4 rows and 2 columns
(B) 5 rows and 3 columns
(C) 2 rows and 4 columns
(D) 3 rows and 5 columns
(E) 3 rows and 2 columns

Solution:

If rows $= m$, and columns $= n$, then

$m \times n$ • $n \times p$ (Columns of 1st are equal to rows of 2nd). Cancel n, hence result is $m \times p$

Hence, In the Matrix AB there are rows of 1st, and columns of 2nd. That is, 4 rows and 2 columns. (A) is answer

8. Given that the Matrix $\begin{bmatrix} 2 & -3 \\ 4 & a \end{bmatrix}$ is singular. Find the value of a?

(A) 2
(B) −2
(C) 3
(D) 6
(E) −6

Solution:

Since the Matrix is singular, therefore Matrix $\begin{bmatrix} 2 & -3 \\ 4 & a \end{bmatrix} = 0$

Now, $2a + 12 = 0$
$2a = -12$
$a = -6$ Answer

9. $(1+i)^4 = ?$

(A) 2
(B) $2i$
(C) −4
(D) $4i$
(E) $-6i$

Solution:

We can write $(1+i)^4 = \{(1+i)^2\}^2 = \{(1+2i-1)\}^2 = (2i)^2 = 4i^2 = 4(-1) = -4$ Answer

10. $(\log_x xy)(\log_{xy} x^y) = ?$

(A) 1
(B) x

(C) y

(D) xy

(E) x^y

Solution:

$(\log_x xy)(\log_{xy} x^y) = \log_x x^y = y$ Answer