MCQs - 1

(Try to find the answer)

1. If A=$\begin{bmatrix}5 & 3 & 10\end{bmatrix}$ *and* $B=\begin{bmatrix}2\\4\\6\end{bmatrix}$ then AB is:

   (a) $\begin{bmatrix}2\\8\end{bmatrix}$ (b) $\begin{bmatrix}8\\2\end{bmatrix}$ (c) $\begin{bmatrix}8 & 2\end{bmatrix}$ (d) $\begin{bmatrix}8 & 2\end{bmatrix}$

2. If the matrix $\begin{bmatrix}p & 2 & 5\\7 & 3 & 4\\5 & -1 & -6\end{bmatrix}$ is singular, then the value of p is:

   (a) 3 (b) 2 (c) 1 (d) 0

3. If A and B are two square matrices of the same order, then which of the following is always true:

   (a) $AB=BA$ (b) $(A+B)^T=A^TB^T$

   (c) $(AB)^T=B^TA^T$ (d) $(AB)^T=A^TB^T$

4. If $A=\begin{bmatrix}1 & 1 & 1\\2 & 3 & 1\end{bmatrix}$, then which of the following true?

   (a) det A=0 (b) det A=-5 (c) det A=5 (d) det A is not defined.

5. The value of the determinant $\begin{vmatrix}-1 & 1 & 1\\1 & -1 & 1\\1 & 1 & -1\end{vmatrix}$ is:

   (a) -4 (b) 0 (c) 1 (d) 4

6. If y = $\sin^{-1}(3x-4x^3)$ *then* $\frac{dy}{dx}$ is:

   (a) $\frac{2}{\sqrt{1-x^2}}$ (b) $\frac{-2}{\sqrt{1-x^2}}$ (c) $\frac{-3}{\sqrt{1-x^2}}$ (d) $\frac{3}{\sqrt{1-x^2}}$

7. If y= e^x , *then* $\frac{dy}{dx}$ is equal to

   (a) xe^{x-1} (b) x (c) 1 (d) y

8. The slope of the curve $x=1-\cos\theta$, $y=\theta-\sin\theta$ at $\theta=\frac{\pi}{4}$ is:

   (a) $\sqrt{2}+1$ (b) $-\sqrt{2}+1$ (c) $\sqrt{2}-1$ (d) $-(\sqrt{2}+1)$

9. If $y=\tan^{-1}(3x^2)$, *then* $\frac{dy}{dx}$ *is*:

   (a) $\frac{3x}{1+3x^4}$ (b) $\frac{6x}{1+9x^4}$ (c) $\frac{9x}{1+9x^2}$ (d) $\frac{1}{1+9x^4}$

10. If f is a differentiable function on the real numbers, which of the following is always true:
    (a) f is discontinuous at a point. (b) f is discontinuous at every point.
    (c) f is continuous at every point. (d) f is continuous only at a finite number of points.

11. If A and B are square matrices of the same order and if $(A+B)^2 = A^2 + 2AB + B^2$ then:
    (a) $A' = A$ (b) $B' = B$ (c) $AB = BA$ (d) $A = -B$

12. If $y = a^x$, *then* $\frac{dy}{dx}$ *is*:
    (a) xa^{x-1} (b) y log a (c) y (d) x log y

13. If $y = \sin^{-1} x + \sin^{-1}\left(\sqrt{1-x^2}\right)$, *then* $\frac{dy}{dx}$ *is*
    (a) 1 (b) 0 (c) -1 (d) $\frac{\pi}{2}$

14. If $\lim_{x\to 2} \frac{x^n - 2^n}{x-2} = 80$ *then* $n =$
    a) 1 b) 3 c) 5 d) 7

15. If $y = \log(\sec x - \tan x)$ *then* $\frac{dy}{dx} =$
    a) $-\sec x$ b) $\sec x + \tan x$ c) $\sec x$ d) sec x – tan x

16. Which of the following is equal to zero?
    (a) $\int_{-\pi/2}^{\pi/2} \cos x\, dx$ (b) $\int_{-\pi/2}^{\pi/2} \sin^7 x\, dx$ (c) $\int_{-\pi/4}^{\pi/4} \sin^2 x\, dx$ (d) $\int_{0}^{\pi/2} \cos^2 x\, dx$

17. The order of the differential equation $\left(\frac{d^2s}{dt^2}\right) + 3\left(\frac{ds}{dt}\right)^3 + 4 = 0$ is:
    (a) 4 (b) 3 (c) 2 (d) 1

18. The area bounded by the curve $y = x^2$, the x-axis and the ordinates at x=1 and x=3 is:
    (a) $\frac{27}{3}$ sq. units. (b) $\frac{26}{3}$ sq. units. (c) $\frac{25}{3}$ sq. units. (d) $\frac{24}{3}$ sq. units.

19. The value of $\int \frac{x}{1-x^4} dx$ is:
    (a) $\frac{1}{4}\log\left|\frac{1+x^2}{1-x^2}\right| + C$ (b) $\frac{1}{4}\log\left|\frac{1-x^2}{1+x^2}\right| + C$
    (c) $-\frac{1}{4}\log\left|\frac{1-x^2}{1+x^2}\right| + C$ (d) $-\frac{1}{4}\log\left|\frac{1+x^2}{1-x^2}\right| + C$

20. $\int_{0}^{\pi/2} \frac{\cos x}{\sin x + \cos x} dx =$
    (a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{8}$

21. $\int_0^4 \sqrt{3x+4}\,dx =$

(a) $\frac{59}{6}$ (b) $\frac{56}{9}$ (c) $\frac{28}{9}$ (d) $\frac{112}{9}$

22. $\int_{-\infty}^{0} e^{2x}dx =$

(a) 0 (b) $\frac{1}{2}$ (c) $-\frac{1}{2}$ (d) 1

23. The area to the curve $y = e^{2x}$ at the point (0,1) is:

(a) $\frac{e^2}{2}$ (b) $\frac{e^2+1}{2}$ (c) $\frac{e^2-1}{2}$ (d) $\frac{e^2+e}{2}$

24. $\int \frac{\cot x dx}{\log \sin x}$ *is*

(a) log sin x+C (b)log(log sin x)+C (c) –log(log sin x) (d) log cot x+C

25. $\int_0^{\frac{\pi}{4}} \tan^2\theta\, d\theta$ *is*

(a) $\frac{\pi}{4}$ (b) $-\frac{\pi}{4}$ (c) $1-\frac{\pi}{4}$ (d) $\frac{\pi}{4}-1$

26. $\int_1^{\infty} \frac{dx}{x}$ *is*

(a) 0 (b) ∞ (c) $-\infty$ (d) 1

27. The area bounded by the curve $xy = 1$, x=1, x=3 and the x-axis is:

(a) log 3 (b) 3 (c) log 2 (d) 2

28. The solution of the differential equation $xdy + ydx = dx$ is:

(a) $x^2y^2 = x$ (b) y(x–1) = C (c) x(x–1) = y (d) x(y–1) = C

29. $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}}dx$ *is*

(a) 0 (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{4}$ (d) π

30. $\int \frac{e^x(1+x)}{\cos^2(xe^x)}dx$ *is*

(a) $2\log\cos(xe^x)+C$ (b) $\sec(xe^x)+C$

(c) $\tan(xe^x)+C$ (d) $e^x\tan(xe^x)+C$

31. $\int_0^{\frac{\pi}{2}} \log\tan x\,dx = ...$

(a) 1 (b) 0 (c) -1 (d) $\frac{\pi}{4}$

32. The area between the curve $y^2 = x$ and x=1 is:

(a) $\frac{2}{3}$ (b) $\frac{3}{2}$ (c) 1 (d) 0

33. The derivative of $\cos\left(2x^0\right)$ is

(a) $-2\sin\left(2x^0\right)$ (b) $-\frac{\pi}{180}\sin\left(\frac{\pi x}{180}\right)$ (c) $-\frac{90}{\pi}\sin\left(\frac{90x}{\pi}\right)$ (d) $-\frac{\pi}{90}\sin\left(\frac{\pi x}{90}\right)$

(e) none of these

34. If $y = x|x|, \frac{dy}{dx} =$

(a) 2x (b) -2x (c) $2|x|$ (d) $|x| + x$ (e) none of these $\frac{10}{36}$

35. The value of the integral $\int \frac{dx}{\sqrt{9x-4x^2}}$ *equals*

(a) $\frac{1}{9}\sin^{-1}\left(\frac{9x-8}{8}\right)+C$ (b) $\frac{1}{2}\sin^{-1}\left(\frac{8x-9}{9}\right)+C$

(c) $\frac{1}{3}\sin^{-1}\left(\frac{9x-8}{8}\right)+C$ (d) $\frac{1}{2}\sin^{-1}\left(\frac{9x-8}{9}\right)+C$

36. If $\begin{bmatrix} p & 0 \\ 0 & q \end{bmatrix}$ *and* $AA^T = I$ *then*

a) $p=1, q=1$ b) $p=1, q=-1$ c) $=\pm 1, q=\pm 1$ d) $p=q=0$

37. If $A=\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$ *and* $B=\begin{vmatrix} a_1 & b_1 & ma_1+nb_1+c_1 \\ a_2 & b_2 & ma_2+nb_2+c_2 \\ a_3 & b_3 & ma_3+nb_3+c_3 \end{vmatrix}$ then B=

a) mA b) nA c) mA + nA d) A

38. The value of $\int_0^{\pi/2} \cos^2 x dx$ is

a) 1 b) 0 c) $\frac{\pi}{4}$ d) π

39. The value of $\int_0^{\pi/2} \cos^2 x\, dx$ *is*

a) 1 b) $\frac{\pi}{2}$ c) $\frac{\pi}{4}$ d) π

40. The area between $y = e^x - 1$, the x-axis and x = 2 is

a) $e^2 - 1$ b) $e^2 - 2$ c) $e^2 - 3$ d) e^2

41. The solution of the differential equation $x\left(1+y^2\right)^{\frac{1}{2}} dx + y\left(1+x^2\right)^{\frac{1}{2}} dy = 0$ *is*

a) $\sin^{-1} x + \sin^{-1} y = C$ b) $\tan^{-1} x - \tan^{-1} y = C$

c) $\left(1+x^2\right)^{\frac{1}{2}} + \left(1+y^2\right)^{\frac{1}{2}} = C$ d) $x^2 + y^2 = \left(1+x^2\right)^{\frac{1}{2}} + \left(1+y^2\right)^{\frac{1}{2}} + C$