1) If $2\sin^{-1}x = \sin^{-1}2x\sqrt{1-x^2}$ then $x \in$

A) $\left[-\frac{1}{\sqrt{2}}, 1\right]$

B) $[0,1]$

C) $\left[\frac{1}{\sqrt{2}}, 1\right]$

D) $\left[-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right]$

2) $\cos\left(\sin^{-1}\frac{1}{5} + \cos^{-1}x\right) = 0$ then $x =$

A) 1

B) $\frac{1}{5}$

C) 0

D) 5

3) Binary operation $*$ on R is given by $a * b \equiv \frac{a+b}{2}$. Then $*$ is

A) not commutative but associative

B) commutative and associative

C) commutative but not associative

D) not commutative and not associative

4) Let $A = \{-1, -2,3,4\}$. Number of all one-one functions from the set A to itse is

A) 24

B) 16

C) 4

D) 256

5) If functions f and g are defined as:

$$f: \left[0, \frac{\vec{\pi}^2}{2}\right]' \to \cdot,\ f(x) = \sin x \text{ and}$$
$$g: \left[0, \frac{\pi}{2}\right]_0 \to \mathrm{R},\ g(x) = \cos x$$

then

A) $f + g$ is one-one and fg is not one-one

B) $f+g$ is not one-one and fg is one-one

C) $f+g$ is not one-one and fg is not one-one

D) $f+g$ is one-one and fg is one-one

6) If $y=100e^{2x}+200e^{-2x}$ and $\frac{d^2y}{dx^2}=ay$ then $a=$

A) 4

B) -4

C) 2

D) 0

7) Function $f:[1.2,1.9]\to \mathrm{R}, f(x)=[x]$, where $[x]$ denotes the greatest integer less than or equal to x. Then

B) f is not differentiative

A) $f'(x)=1$

C) $f'(x)=0$

B) f is not continuous function

8) If $x=\sqrt{10^{\sin^{-1}\iota}}, y=\sqrt{10^{\cos^{-1}\iota}}$ then $\frac{dy}{dx}=$

A) $-\frac{x}{y}$

B) $\frac{y}{x}$

C) 0

D) $-\frac{y}{x}$

9) The interval in which $y=x^2e^{-x}$ is increasing is

A) $(0,2)$

B) $(-2,0)$

C) $(2,\infty)$ (Ð) $(-\infty,\infty)$

10) Equation of tangent line to $16x^2+25y^2=1$, which is parallel to Y-axis is

A) $5y-1=0$

B) $5x-1=0$

C) $4y+1=0$

(d) $4x-1=0$

11) A cylindrical tank of diameter 20m is being filled with wheat at the rate of 314 cubic meter per hour. Then the depth of the wheat is increasing at the rate of

A) 0.5m/h

B) 0.1m/h

C) 1.1m/h

D) 1m/h

12) $\int e^{\sin x}\sin 2x dx = \ +C.$

A) $e^{\sin x}(\sin x+1)$

B) $2e^{\sin x}(\sin x-1)$

C) $2e^{\sin x}(\sin x+1)$

D) $e^{\sin x}(\sin x-1)$

13) $\int \sqrt{\frac{\cos x-\cos^3 x}{1-\cos^3 x}}dx = +\mathrm{C}.$

A) $-\frac{3}{2}\cos^{-1}\left(\cos^{3/2}x\right)$

B) $-\frac{2}{3}\cos^{-1}\left(\cos^{3/2}x\right)$

C) $\frac{3}{2}\cos^{-1}\left(\cos^{3/2}x\right)$

D) $\frac{2}{3}\cos^{-1}\left(\cos^{3/2}x\right)$

14) $\int (x+1)(x+3)(x+2)^7 dx =$

A) $\frac{(x+3)^{10}}{10}+\frac{(x+3)^8}{8}$

B) $\frac{(x+2)^{10}}{10}+\frac{(x+2)^8}{8}$

C) $\frac{(x+3)^{10}}{10}-\frac{(x+3)^8}{8}$

D) $\frac{(x+2)^{10}}{10}-\frac{(x+2)^8}{8}$

15) $\int \frac{x}{(x-1)(x-2)}dx = \ \square\ + C.$

A) $\log|(x-1)(x-2)|$

B) $\log\left|\frac{(x-2)^2}{x-1}\right|$

C) $\log\left|\left(\frac{x-1}{x-2}\right)^2\right|$

D) $\log\left|\frac{(x-1)^2}{x-2}\right|$

16) $\int_{-\pi/4}^{\pi/4} \sin^2 x dx =$

A) $\frac{\pi}{4}$

B) $\frac{\pi}{4} - \frac{1}{2}$

C) $\frac{\pi}{4} - 1$

D) $\frac{\pi}{4} + \frac{1}{2}$

17) $\int_{\frac{\pi}{2}}^{\frac{\pi}{2}} (x^{15} + x\cos x + \tan^{15} x + 1)\, dx =$

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A) 1

B) 2

C) π

D) 0

18) If $f(a+b-x) = f(x)$ then $\int_a^b x\, f(x) dx =$

4) $\frac{a+b}{2}\int_a^b f\,(x) dx$

B) $\frac{a+b}{2}\int_a^b f\,(b+x) dx$

C) $\frac{b-a}{2}\int_a^b f\,(x) dx$

D) $\frac{a+b}{2}\int_a^b f\,(b-x) dx$

19) $\int_0^1 \tan^{-1}\left(\frac{2x-1}{1+x-x^2}\right) dx =$

A) $\frac{\pi}{4}$

B) 0

C) -1

D) 1

20) The area of the region bounded by the two parabolas $y = x^2$ and $y^2 = x$ is

A) $\frac{3}{4}$

B) 3

C) $\frac{1}{2}$

D) $\frac{1}{3}$

21) The area of the parabola $x^2 = 12y$ bounded by its latus rectum is

A) 3

B) $\frac{24}{3}$

C) 24

D) $\frac{8}{3}$

22) The area of the region bounded by the curve $y^2 = 4x$ and the line $x = 3$ is

A) $3\sqrt{3}$

B) $3\sqrt{8}$

C) 8 (ठ) $8\sqrt{3}$

23) If length of subnormal at any point of a curve is always constant then that curve represents a

A) Parabola

B) Hyperbola

C) Ellipse

D) Rectangular hyperbola

24) The integrating factor of the differential equation $x\frac{dy}{dx} - y = x^2$ is

A) e^{-x}

B) $\frac{1}{x}$ Old Papers = VisionPapers. in

C) e^{x}

D) x

25) If the vectors $\hat{\imath} - \hat{\jmath} + \hat{k}, 3\hat{\imath} + \hat{\jmath} + 2\hat{k}$ and $\hat{\imath} + \lambda\hat{\jmath} - 3\hat{k}$ are coplanar then $\lambda =$

A) 15

B) -15

C) 5

D) $\frac{5}{3}$

26) Let the vectors $\vec{a}$ and $\vec{b}$ be such that $|\vec{a}| = 3$ and $|\vec{b}| = \frac{\sqrt{2}}{3}$. If $\vec{a} \times \vec{b}$ is a unit vector, then the angle between $\vec{a}$ and $\vec{b}$ is

A) $\frac{\pi}{2}$

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

C) $\frac{\pi}{3}$

D) $\frac{\pi}{6}$

27) If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors such that $\vec{a} + \vec{b} + \vec{c} = \vec{0}$ then $\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a} =$

A) $-\frac{1}{2}$

B) $\frac{3}{2}$

C) $\frac{1}{2}$

D) $-\frac{3}{2}$

28) The angle between the line $\frac{x+1}{2} = \frac{y}{3} = \frac{z-3}{6}$ and the plane $10x + 2y - 11z = 3$ is

A) $\cos^{-1}\left(\frac{1}{8}\right)$

B) $\cos^{-1}\left(\frac{8}{21}\right)$

C) $\sin^{-1}\left(\frac{8}{21}\right)$

D) $\sin^{-1}\left(\frac{1}{8}\right)$

29) The area of a triangle having the points $A(-1,1,1), B(1,2,3)$ and $C(2,3,1)$ as its vertices is

A) $\frac{\sqrt{19}}{2}$

B) $\frac{\sqrt{21}}{2}$

C) $\frac{19}{2}$

D) $\frac{21}{2}$

30) The lines $\frac{1-x}{3} = \frac{7y-14}{2p} = \frac{z-3}{2}$ and $\frac{7-7x}{3p} = \frac{y-5}{1} = \frac{6-z}{5}$ are at right angles then value of p is

A) $\frac{11}{7}$

B) 7

C) $\frac{70}{11}$

D) $\frac{7}{11}$

31) The mean number of heads in three tosses of a fair coin is

A) 3.5

B) 0.5

C) 15

D) 1.5

32) If for Bernoulli distribution $B\left(10, \frac{1}{2}\right)$, it is given that $P(X \leq 2) = m\left(\frac{1}{2}\right)^{10}$ then $m =$

A) 101

B) 55

C) 56

D) 46

33) Probability that Aspeaks truth is $\frac{4}{5}$. A coin is tossed. A reports that a head appears. The probability that actually there was head is

A) 2/5

B) 4/5

C) 1/5

D) 1/2

34) Corner points of the feasible region of objective function $Z = 3x + 9y$ of a linear programming problem are (0,10), (5,5), (15,15) and (0,20). Minimum value of Z is

b) 90

A) 70

C) 50

B) 60

35) If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ then $A^3 =$

A) $\begin{bmatrix} \cos 3\theta & \sin 3\theta \\ -\cos 3\theta & \sin 3\theta \end{bmatrix}$

B) $\begin{bmatrix} -\cos 3\theta & \sin 3\theta \\ \sin 3\theta & \cos 3\theta \end{bmatrix}$

C) $\begin{bmatrix} \cos 3\theta & \sin 3\theta \\ -\sin 3\theta & \cos 3\theta \end{bmatrix}$

D) $\begin{bmatrix} \cos 3\theta & -\sin 3\theta \\ -\sin 3\theta & \cos 3\theta \end{bmatrix}$

36) If $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}, 10B = \begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & \alpha \\ 1 & -2 & 3 \end{bmatrix}$ and B is inverse of A then $\alpha =$

A) 10

B) 9

C) 3

D) 5

38) If a, b, c are measurements of sides of $\triangle$ ABC and $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} = 0$ then $\sin^2 A + \sin^2 B + \sin^2 C =$

A) $\frac{13}{4}$

B) $\frac{9}{4}$

C) $\frac{15}{4}$

D) $\frac{11}{4}$

39) If $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ then sum of all the elements of $A^{-1} =$

A) 6

B) -6

C) 0

D) $\frac{11}{6}$

40) If $\sin^{-1}a = \alpha + \beta, \sin^{-1}b = \alpha - \beta$ then $\sin^2\alpha + \cos^2\beta =$

A) ab

B) $1 - ab$

C) $ab - 1$

D) $1 + ab$