Exercise

1. Number of relations of a set having 5 elements are

    A. 5

    B. 25

    C. 2^5

    D. 2^{25}

Answer:

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2. If a matrix A = $\left(\alpha_{ij}\right)_{3 \times 4}$ and $\alpha\left(i_j\right) = \left(-1\right)^{\hat{i}+\hat{j}}$, then the element fo 3rd row and 2nd column will be

A. 1

B. -1

C. 2

D. 0

Answer:

3. If f(x) = $\log_e\left(\dfrac{1-x}{1+x}\right)$, then f'(0) is

A. 2

B. -2

C. 0

D. $-1/2$

Answer:

4. Find the interval of the function f(x) = x^3 in which it is increasing

A. $(-\infty, \propto)$

B. $(0, \propto)$

C. $(- \propto , 0)$

D. $(\propto , 0)$

Answer:

5. A and B are two independent events P(A) = $\dfrac{1}{3}$ and $P(A \cap B) = \dfrac{1}{6}$, then $P\left(A^C \cap B^C\right)$ will be

A. $\dfrac{1}{6}$

B. $\dfrac{2}{3}$

C. $\dfrac{1}{3}$

D. $\dfrac{2}{9}$

Answer:

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6. The value of $\displaystyle\int_{-1}^{1} |2x + 1| \, dx$ is

A. $\dfrac{5}{2}$

B. $\dfrac{9}{2}$

C. $\dfrac{3}{2}$

D. 1

Answer:

7. find the length of the perpendicular drawn from the point (2,1,-1) on the

line x - 2y + 4z = 9

A. $\dfrac{\sqrt{13}}{21}$

B. $\dfrac{13}{21}$

C. $\dfrac{13}{\sqrt{21}}$

D. $\dfrac{\sqrt{13}}{21}$

Answer:

8. If $\sin^{-1} x - \cos^{-1} x = \dfrac{\pi}{6}$ then x is

A. 1

B. $\dfrac{1}{2}$

C. $\dfrac{1}{\sqrt{2}}$

D. $\dfrac{\sqrt{3}}{2}$

Answer:

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9. The I.F. of the differential equation x log x $\dfrac{dy}{dx} + 2y = \log x$ is

A. $(\log x)^2$

B. x^2

C. $\log x$

D. $\dfrac{1}{\log x}$

Answer:

10. Let * be a binary operations on Z and is defined by , a * b = a + b + 1, $a, b \in Z$. Find the identity element.

11. Evaluate: $4\left(2\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{7}\right)\right)$

12. Prove that (a+b+c+x) is a factor of $\begin{vmatrix} x+a & b & c \\ b & x+c & a \\ c & a & x+b \end{vmatrix}$

13. If P = $\begin{pmatrix} 1 & 2 & 1 \\ 1 & 3 & 1 \end{pmatrix}$ and Q = PP^T , then find Q

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14. Verify Rolle's theorem for the function f(x) = sin x + cosx in the interval

$o \leq x \leq \pi/2$

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15. Evaluate : $\displaystyle\lim_{x \to 0} \frac{\log_e \cos x}{\sin^2 x}$

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16. Evaluate: $\displaystyle\int \left(\frac{\cos x + x \sin x}{x(x + \cos x)} \right) dx.$

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17. If $x > \dfrac{1}{2}$, show that the function f(x) = $x\left(4x^2 - 3\right)$ is steadily increasing.

18. If $\left|\vec{a}\right| = \sqrt{3}$, $\left|\vec{b}\right| = 2$ and $\vec{a} \cdot \vec{b} = \sqrt{6}$, then find the angle between $\vec{a}$ and $\vec{b}$.

19. If the line $\dfrac{x-2}{6} = \dfrac{y-1}{\lambda} = \dfrac{z+5}{-4}$ is perpendicular to the straight line 3x - y - 2z = 7, then find the value of λ

20. The probability that A hits a target is $\dfrac{1}{3}$ and the probability that B hits it is $\dfrac{2}{5}$. What is the probability that the target will be hit if both A

and B shoot at it?

21. An unbiased coin is toosed 7 times. Find the probability of getting an least 6 heads by binomial distribution.

22. answer any one question : (ii) prove that ,

$$\tan\left(\frac{\pi}{4} + \frac{1}{2}\left(\cos^{-1}\left(\frac{a}{b}\right)\right)\right) + \tan\left(\frac{\pi}{4} - \frac{1}{2}\left(\cos^{-1}\left(\frac{a}{b}\right)\right)\right) = \frac{2b}{a}.$$

23. Solve :
$$\begin{vmatrix} x+4 & 2x & 2x \\ 2x & x+4 & 2x \\ 2x & 2x & x+4 \end{vmatrix} = 0$$

24. By using properties of determinants. Show that:

$$\left|1 + a^2 - b^2;\ 2ab;\ -2b : 2ab;\ 1 - a^2 + b^2;\ 2a : 2b;\ -2a;\ 1 - a^2 - b^2\right| = \left(1\ -\right.$$

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25. If $y^{\frac{1}{3}} + y^{-\frac{1}{3}}$ = 2x, prove that $\left(x^2 - 1\right)y_2 + xy_1 = 9y.$

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26. Evaluate : $\displaystyle\int \frac{\log_e(x + 1)}{(x + 1)^2}\,dx$

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27. Evaluate : $\displaystyle\int \left(5^{5^{5^x} \cdot 5^{5^x} \cdot 5^x}\right)dx$

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28. Solve the differential equation: $\left(1 + y^2\right) + \left(x - e^{\tan^{-1}y}\right)\dfrac{dy}{dx} = 0$

29. Find the unit vector which is perpendicular to both $\overrightarrow{a} = 2\hat{i} + 3\hat{j} - \hat{k}$ and $\overrightarrow{b} = 3\hat{i} - \hat{j} + \hat{k}$ and also find the angle between them.

30. If $\overrightarrow{a} = \hat{i} + \hat{j} + \hat{k}$, $\overrightarrow{b} = \hat{j} - \hat{k}$ then find a vector $\overrightarrow{c}$, such that $\overrightarrow{a} \times \overrightarrow{c} = \overrightarrow{b}$ and $\overrightarrow{a} \cdot \overrightarrow{c} = 3$.

31. Evaluate: $\underset{n \to \alpha}{L\,t}\left[\dfrac{1}{\sqrt{2n - 1^2}} + \dfrac{1}{\sqrt{4n - 2^2}} + \dfrac{1}{\sqrt{6n - 3^2}} + \ldots + \dfrac{1}{n}\right]$

32. Evaluate : $\displaystyle\int_0^{\frac{\pi}{4}} \frac{\sin^2 x \cos^2 x\, dx}{\left(\sin^3 x + \cos^3 x\right)^2}$

33. A discreate random variable x has the following probability distribution:

x	4	5	6	8
p(x)	0·1	.0·3	0·4	0·2

Find mean and standard deviation.

34. answer any two questions :(iii) if the straight line lx+my=n be a normal to the hyperbola $\dfrac{x^2}{a^2} - \dfrac{y^2}{b^2} = 1$, then by the application of calculus prove that $\dfrac{a^2}{l^2} - \dfrac{b^2}{m^2} = \dfrac{\left(a^2 + b^2\right)^2}{n^2}$.

35. Find the area enclosed by the curves $x^2 = y$, $y = x + 2$ and x-axis

36. A 5 ft long man walks away from the foot of a $12\frac{1}{2}$ ft high lamp post at the rate of 3 mile/h. Find the rate at which his shadow is increasing.