MATHS

BOOKS - UNITED BOOK HOUSE

QUESTION PAPER 2016

Exercise

1. If the probability of success of a binomial distrubiton is $\frac{1}{4}$ and the standard deviation is 3, then the value of its mean is

A. 6

B. 8

C. 12

D. 15

Answer:

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2. IR is a set of real number. If the realtion R over a set A is defined such that R= {(a,b):a-b< 3, $a, b, \in IR$}, then relation R is

A. transitive

B. equivalence

C. reflexive

D. symmetric

Answer:

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3. If $P(A) = \frac{3}{7}, P(B) = \frac{4}{7}, P(A \cap B) = \frac{2}{9}$ then the value of $P(A/B)$ is

A. $\frac{7}{18}$

B. $\frac{14}{27}$

C. $\frac{5}{18}$

D. $\frac{4}{9}$

Answer:

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4. Is $\sec^{-1} x = \operatorname{cosec}^{-1} y$, then the value of $\cos^{-1}\left(\frac{1}{x}\right) + \cos^{-1}\left(\frac{1}{y}\right)$ will be

A. π

B. $\frac{2\pi}{3}$

C. $\frac{5\pi}{3}$

D. $\frac{\pi}{2}$

Answer:

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5. The solution of the differenbtial equation $\frac{dy}{dx} = e^{x+y}$ is

A. $e^x + e^y = c$

B. $e^x - e^{-y} = c$

C. $e^x + e^{-y} = c$

D. none of these.

Answer:

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6. If A is square matric and $A^2 = A$, $(I + A)^3 - 7A$ will be

A. A

B. I

C. I-A

D. 3A

Answer:

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7. The line $\frac{x-1}{2} = \frac{y-2}{-3} = \frac{z+5}{4}$ meets the plane 2x+4y-z= 3 at the point whose coordinates are

A. (3,1,-1)

B. (3,-1,1)

C. (3,-1,-1)

D. none of these.

Answer:

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8. If $f(x) = \frac{x^2}{1+x^2}$ then the range of f is

A. $[1,\infty)$

B. [0,1)

C. [-1,1]

D. (0,1]

Answer:

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9. If $\left|\vec{a}\right| = 4, \left|\vec{b}\right| = 2\sqrt{3}$ and $\left|\vec{a} \times \vec{b}\right| = 12$ then the angle between the vectors $\vec{a}$ and $\vec{b}$ is

A. $\frac{\pi}{3}$

B. $\frac{\pi}{6}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{2}$

Answer:

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10. IF $f(x) = \log_x(\log x)$ then the value of f'(e) is

A. e

B. $\frac{2}{e}$

C. $\frac{1}{e}$

D. 0

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

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12. Evaluate: $\begin{vmatrix} \alpha & \beta & \gamma \\ \alpha^2 & \beta^2 & \gamma^2 \\ \beta+\gamma & \gamma+\alpha & \alpha+\beta \end{vmatrix}$

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13. IF $A=\begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix}$ and $A^2-4A+3I=0$, where I is the unit matric or order 2, then find A^{-1}.

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14. If $f(x) = \begin{cases} \frac{|\sin x|}{x} & when x = 0 \\ 1 & when x \neq 0 \end{cases}$

then examine the continuity of the function at x=0.

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15. Find the differential coefficient of $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ with respect to $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$.

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16. Evaluate: $\int \left\{ \frac{1}{\log_e x} - \frac{1}{(\log_e x)^2} \right\} dx$

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17. Find the differential equation of all circles which touch the x-axis at the origin.

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18. Evaluate: $\lim_{x \to 0} \left(\frac{\log_e(1+\alpha x)}{e^{2x}-1} \right)$

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19. IF the projection of $\vec{a} = \lambda\hat{i} + \hat{j} + 4\hat{k}$ on $\vec{b} = 2\hat{i} + 6\hat{j} + 3\hat{k}$ is 4 units, then find λ.

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20. Find the angle between the planes x-y+2z=9 and 2x+y+z=7.

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21. If $P(A/B) = 0.75, P(B/A) = 0.6$ and $P(A) = 0.4$ find the value of $P\left(\overline{A}/\overline{B}\right)$

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22. If the number of heads obtained is denoted by X when two unbiased coins are tossed then find the mean value of X.

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23. A relation R is defined on the set of all natural numbers IN by: $(x, y) \in R \Rightarrow (x - y)$ is divisible by 5 for all $x, y \in IN$. Prove that R is an equivalence relation on IN.

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24. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \pi$ then prove that $x\sqrt{1-x^2} + y\sqrt{1-y^2} + z\sqrt{1-z^2} = 2xyz.$

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25. Express the matric $A = \begin{bmatrix} -3 & 4 & 1 \\ 2 & 3 & 0 \\ 1 & 4 & 5 \end{bmatrix}$ as the sum of a symmetric matrix and a skex symmetric matrix.

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26. If p,q,r are not in geometric progression and $\begin{vmatrix} 1 & \frac{q}{p} & \alpha + \frac{q}{p} \\ 1 & \frac{r}{q} & \alpha + \frac{r}{q} \\ p\alpha + q & q\alpha + r & 0 \end{vmatrix} = 0$ then prove that $p\alpha^2 + 2q\alpha^2 + r = 0$

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27. Prove that, $\begin{vmatrix} a^2+1 & ab & ac \\ ab & b^2+1 & bc \\ ca & cb & c^2+1 \end{vmatrix} = 1 + a^2 + b^2 + c^2.$

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28. If $\sin y = x \sin(a+y)$ then show that $\frac{dy}{dx} = \frac{\sin a}{1 - 2x\cos a + x^2}.$

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29. $pv^a = c$ (a and c are constants) then show that $v^2 \frac{d^2p}{dv^2} = a(a+1)p.$

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30. Evaluate: $\int e^x \frac{x-3}{(x-1)^3} dx$

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31. Evaluate: $\int \sqrt{1+\cos ecx} dx$

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32. Solve: $\left(1+3e^{y/x}\right)dy + 3e^{y/x}\left(1-\frac{y}{x}\right)dx = 0$

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33. If the area of a circle increases uniformly, then show that the rate of increment of its circumference is inversely proportional to its radius.

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34. The vectors $\vec{a}, \vec{b}, \vec{c}$ are such that $\vec{a} + \vec{b} + \vec{c} = \vec{0}$, If $\left|\vec{a}\right| = 3, \left|\vec{b}\right| = 4$ and $\left|\vec{c}\right| = 5$, then show that $\vec{a} . \vec{b} + \vec{b} . \vec{c} + \vec{c} . \vec{a} = -25$

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35. If $\vec{\alpha} = \lambda\hat{i} + \hat{j} + 3\hat{k}, \vec{\beta} = -\hat{i} + 2\hat{j} + \hat{k}, \vec{\gamma} = 3\hat{i} + \hat{j} + 2\hat{k}$ and $\left[\vec{\alpha}\,\vec{\beta}\,\vec{\gamma}\right] = -10$ find the value of λ.

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36. Evaluate (with the help of definite integral):

$$\lim_{n\to\infty}\left\{\left(1+\frac{1}{n}\right)\left(1+\frac{2}{n}\right)\ldots\left(1+\frac{n}{n}\right)\right\}^{\frac{1}{n}}$$

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37. Evaluate: $\int_{\frac{\pi}{4}}^{3\frac{\pi}{4}} \frac{\theta}{1+\sin\theta}d\theta$

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38. if a and b are any two constants, then prove that $Var(aX + b) = a^2 Var(X)$.

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39. Minimize the following objective function Z graphically: (Graph sheet is not required):

Z = 3x+2y

subject to $2x + y \succ 14$

$2x + 3y \geq 22$

x+yge5 and xge0,yge0`.

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40. If the normal at any point to the curve $x^{2/3} + y^{2/3} = a^{2/3}$ makes an angle ϕ with the x-axis then prove that the equation of the normal is $y\cos\phi - x\sin\phi = a\cos 2\phi$.

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41. find the volume of the largest cylinder inscribed in the sphere of radius r cm.

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42. SolvE: $x^2dy + y(x+y)dx = 0$

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43. Find the equation of the plane passing through the points (-1,1,1) and (1,-1,1) and is perpendicular to the plane x+2y+2z=5.

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