



MATHS

BOOKS - UNITED BOOK HOUSE

SET 17

Exercise

1. Find the order of the differential equation

$$\left(\frac{d^4y}{dx^4}\right)^3 - \frac{d^3y}{dx^3} = \sqrt{1 + \frac{dy}{dx}}$$

A. 6

B. 4

C. 3

D. 7

Answer:



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2. If $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}^n = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then the value of n is

A. 2

B. 3

C. 4

D. 6

Answer:



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3. The S.D. of a binomial distribution with parameters n and p is

A. no

B. \sqrt{np}

C. $\sqrt{np(1 - p)}$

D. $\sqrt[2]{np}$

Answer:



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4. The angle between the lines whose direction ratios are proportional to 1, -2, 1 and 4, 3, 2 is.....

A. $3\frac{\pi}{4}$

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

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

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

Answer:



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5. If $\vec{\alpha} = 2\hat{i} + 3\hat{j} - 6\hat{k}$ and $\vec{\beta} = p\hat{i} - \hat{j} + 2\hat{k}$ are two parallel vectors, then the value of p is

A. $-\frac{1}{3}$

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

C. $-\frac{2}{3}$

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

Answer:



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6. Which of the following solution of the differential equation $dx - dy + y dx + xdy = 0$ is not admissible?

A. $\log|(x-1)(y+1)| = c$

B. $(x - 1)^2 \{ (y + 1)^2 = c^2$

C. $-\log|(x - 1)(y + 1)| = \log c$

D. $\log(x + 1)(y - 1) | = \log c.$

Answer:



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7. Three events A,B and C are mutually exclusive and exhaustive , if $P(A)=3/5$ and $P(B)=1/6$, then the value of $P(C)$ is

A. $\frac{23}{30}$

B. $\frac{7}{30}$

C. $\frac{1}{10}$

D. $\frac{9}{10}$

Answer:



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8. If for a random variable x , the variance of x is 1.84 and the expectation of x is 3.6, then the expectation of x^2 is

A. 14.8

B. 11.12

C. 5.44

D. 6.98

Answer:



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9. Find the value of $\sin \cot^{-1} \cos(\tan^{-1}(2))$



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10. A binary operation $*$ is defined on the set of real numbers \mathbb{R} by $a*b = 2a + b - 5$ for all $a, b \in \mathbb{R}$

If $3*(x*2) = 20$, find x



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11. Solve for a, b, c and d when

$$\begin{pmatrix} b + c & c + a \\ 7 - d & 6 - c \end{pmatrix} = \begin{pmatrix} 9 - d & 8 - d \\ a + b & a + b \end{pmatrix}.$$



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12. Evaluate :

$$\begin{vmatrix} 0 & (a - b)^3 & (b - c)^3 \\ (b - a)^3 & 0 & (c - a)^3 \\ (c - b)^3 & (a - c)^3 & 0 \end{vmatrix}$$



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13. Examine whether the following function is continuous at $x = 0$.

$$\phi(x) = \begin{cases} \frac{|x|}{x} & \text{when } x \neq 0 \\ 0 & \text{when } x = 0 \end{cases}$$



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14. Find the differential co-efficient of $\log x_{10}$ with respect to $\tan^{-1} x$.



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



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16. Find if Lagrange's Mean Value Theorem is applicable to the function

$$f(x) = x + \frac{1}{x} \text{ in } [1,3]$$



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17. Eliminating a and b, find the differential equation of

all ellipse of the form $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.



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18. Evaluate: $\lim_{x \rightarrow 0} t(1 + 3x)^{\frac{x+2}{x}}$



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19. If \vec{a} , \vec{b} , \vec{c} are unit vectors satisfying the condition

$\vec{a} + \vec{b} + \vec{c} = 0$ then show that

$$\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a} = -3/2.$$



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20. Find the value of λ so that the plane

$$\vec{r} \cdot \left(\vec{i} + 2\vec{j} + 3\vec{k} \right) = 7 \quad \text{and}$$

$$\vec{r} \cdot \left(\lambda \vec{i} + 2\vec{j} - 7\vec{k} \right) = 26 \quad \text{are perpendicular to}$$

each other.



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21. If $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{3}$ and $P(A - B) = \frac{1}{6}$

then verify whether a and B are two independent event or not.



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22. An unbiased coin is tossed 6 times. Find the probability of at least five heads by binomial distribution.



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23.

Given

$$A = \begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix} \& B = \begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix}$$

Find AB



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24.

Show that:

$$\begin{vmatrix} a & b - c & c + b \\ a + c & b & c - a \\ a - b & b + a & c \end{vmatrix} =$$

$$(a + b + c)(a^2 + b^2 + c^2).$$



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25. Show that $\int \frac{2x + 3}{x^2 - 3x + 2} dx$



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26. If $x = \sin \theta$ and $y = \cos p\theta$, p is constant, then find the value of $(1 - x^2)y_2 - xy_1$



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27. The integral $\int \frac{\sec^2 x}{(\sec x + \tan x)^{\frac{9}{2}}} dx$ equals (for some arbitrary constant K).

$$(a) - \frac{1}{(\sec x + \tan x)^{\frac{11}{2}}} \left\{ \frac{1}{11} - \frac{1}{7}(\sec x + \tan x)^2 \right\} + K$$

$$(b) \frac{1}{(\sec x + \tan x)^{\frac{11}{2}}} \left\{ \frac{1}{11} - \frac{1}{7}(\sec x + \tan x)^2 \right\} + K$$

$$(c) - \frac{1}{(\sec x + \tan x)^{\frac{11}{2}}} \left\{ \frac{1}{11} + \frac{1}{7}(\sec x + \tan x)^2 \right\} + K$$

$$(d) \frac{1}{(\sec x + \tan x)^{\frac{11}{2}}} \left\{ \frac{1}{11} + \frac{1}{7}(\sec x + \tan x)^2 \right\} + K$$



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28. Show that $\int \frac{2x + 3}{x^2 - 3x + 2} dx$



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29. If θ be the angle between two unit vectors \vec{e}_1 and

\vec{e}_2 then prove that $|\vec{e}_1 - \vec{e}_2| = 2 \sin\left(\frac{\theta}{2}\right)$



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30. Evaluate (with the help of definite integral)

$$\lim_{n \rightarrow \infty} \int_0^1 \left(\frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{6n} \right) dx$$



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31. Find the value of $\int_0^{\pi/2} \frac{1}{(b^2 \cos^2 x + a^2 \sin^2 x)} dx$



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32. A man takes a step forward with probability 0.4 and backward with probability 0.6 find the probability that the end of eleven steps he is just one step away from the starting point.



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33. A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn and are found to be both diamonds. Find the probability of the lost card being a diamond.



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34. If the area of the region $\{(x, y) : 0 \leq y \leq x^2 + 1, 0 \leq y \leq x + 1, 0 \leq x \leq 2\}$ is A , then the value of $3A - 17$ is ____



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35. (b) answer any two questions : (i) a circular ink blot grows at the rate of $2c \frac{m^2}{\text{sec}}$. find the rate at which the radius is increasing after $2\left(\frac{6}{11}\right)$ seconds



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36. Find the distance of the point (1,-2,3) from the plane $x - y + z = 5$ measured along a line parallel in

$$\frac{x}{2} = \frac{y}{3} = \frac{z}{-6}$$



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