MATHS

BOOKS - UNITED BOOK HOUSE

SET 7

Exercise

1. Let $A = \{1, 2, 3\}$. Then show that the number of relations containing $(1, 2)$ and $(2, 3)$ which are reflexive and transitive but not symmetric is three.

A. 1

B. 2

C. 3

D. 4

Answer:

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2. State which of the following is the value of $\left(\cos^{-1}\left(\frac{1}{2}\right)+2\sin^{-1}\left(\frac{1}{2}\right)\right)$?

A. $\frac{5\pi}{6}$

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

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

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

Answer:

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

A. A

B. I-A

C. I

D. 3A

Answer:

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4. The function f(x) = |x+1|

A. continuous at x= -1

B. differentiable at x= -1

C. differentiabel at $x = \pm 1$

D. None of these

Answer:

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5. The value of $\int_{-a}^{a} \frac{xe^{x^4}}{1+x^2} dx$ is

A. e^{a^4}

B. 1

C. $2e^{a^x}$

D. 0

Answer:

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6. The approximate error in measuring the area of a square of side 10 cm due to error of 0.05 cm in measuring its side is

A. $0.5cm^2$

B. $0.1cm^2$

C. $0.2cm^2$

D. $1cm^2$

Answer:

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7. 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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8. Angle between the straight lines $\frac{x-5}{7}=\frac{y+2}{-5}=\frac{z}{1}$ and $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ is

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

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

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

D. π

Answer:

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9. IF $P(A\cap B)=\frac{5}{13}$ then the value of $P\left(A^C\cup B^C\right)$ is

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

B. $\frac{6}{13}$

C. $\frac{7}{13}$

D. $\frac{8}{13}$

Answer:

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10. The probability fuction of a random variable is always

A. ≥ 1

B. > 1

C. positive

D. non negative

Answer:

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11. Prove that the operation * an Z defined by a*b = a|b| for all $a, b \in Z$ is closed under*.

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12. Prove that , $\tan^{-1}(\cot x) + \cot^{-1}(\tan x) = \pi - 2x$

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13. Show that $\begin{vmatrix} \cos 15^\circ & \sin 15^\circ \\ \sin 75^\circ & \cos 75^\circ \end{vmatrix} = 0$

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14. If $A = \begin{pmatrix} 3 & 5 \\ 2 & a \end{pmatrix}, B = \begin{pmatrix} 4 & b \\ 2 & 9 \end{pmatrix}$ and $C = \begin{pmatrix} 26 & a \\ 14 & 45 \end{pmatrix}$ find a and b when 2A+5B = C

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15. Prove that $\lim_{x \to 0} \frac{\log(1+x) + \sin x}{e^x - 1} = 2$

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16. If $y = \log\left\{\sin\sqrt{x^2+1}\right\}$ find $\frac{dy}{dx}$

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17. Evaluate: $\int\left(e^{x\log a} + e^{a\log x}\right)$ dx

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18. Write the order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^3 - \left(\frac{dy}{dx}\right)^4 + 5y = x.$

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19. Divide 24 into two parts such that their product is maximum.

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20. If $f(x) = 3x^2 + 15x + 5$, then find the approximate value of f(3.02), using differentails.

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21. Can the numbers $\frac{1}{2}, -\frac{1}{\sqrt{2}}, -\frac{1}{2}$ be the direction cosines of a straight line? Give reason.

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22. Find the equation of the line passing through the point(1,2,3) and parallel to the line $\frac{x-1}{2} = \frac{7-y}{3} = -z$.

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23. Two unbiased dice are thrown. Find the probability that the sum of the faces equals or exceeds 10.

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24. M and E are two equally strong football teams. Findthe probability that M beats E in exactly 5 games out of 8.

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25. Solve: $\tan^{-1}\sqrt{x(x+1)}+\sin^{-1}\sqrt{1+x+x^2}$ = pi/2

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26. If $A=\begin{bmatrix}1 & -1\\ 2 & -1\end{bmatrix}, B=\begin{bmatrix}a & 1\\ b & -1\end{bmatrix}$ and $(A+B)^2=A^2+B^2$ find a and b.

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

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28. Show that $\begin{vmatrix} -1 & b & c \\ a & -1 & c \\ a & b & -1 \end{vmatrix} = (a+1)(b+1)(c+1)\left(\frac{a}{a+1}+\frac{b}{b+1}+\frac{c}{c+1}-1\right)$

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29. If $y = \tan^{-1}\left(\frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}\right)$ show that $\frac{dy}{dx} = \frac{x}{\sqrt{1-x^4}}$.

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30. Evaluate: $\int \frac{\cos x - \sin x}{\sqrt{\sin 2x}} dx$

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31. Evaluate: $\int x\sqrt{\frac{a^2-x^2}{a^2+x^2}}dx$

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

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33. solve : $\sqrt{a^2+x^2}\frac{dy}{dx}+y=\sqrt{a^2+x^2}-x$

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34. Find a unit vector in direction parallel to the sum of the vectors $\vec{a}=2\hat{i}+4\hat{j}-5\hat{k}$ and $\vec{b}=\hat{i}+2\hat{j}+3\hat{k}$. Find also the direction cosines of this vector.

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35. answer any one question : (ii) let $\vec{a} = \hat{i} + 4\hat{j} + 2\hat{k}$, $\vec{b} = 3\hat{i} - 2\hat{j} + 7\hat{k}$ and $\vec{c} = 2\hat{i} - \hat{j} + 4\hat{k}$. Find a vector $\vec{d}$ which is perpendicular to both the vectors $\vec{a}$ and $\vec{b}$ and $\vec{c}.\vec{d} = 18$

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36. Evaluate: $\int_0^1 \frac{\tan^{-1} x}{1+x^2} dx.$

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37. Evaluate :

$$\lim_{n \to \infty} \left[\frac{1}{n} + \frac{1}{n+1} + \frac{1}{n+2} + ... + \frac{1}{4n} \right]$$

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38. Three groups of children contain respectively 3 girls and 1 boy, 2 girls and 2 boys and 1 girl and 3 boys one child is selected at random from each group find the chance that the selected group contain 1 girl and 2 boys.

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39. 5% of the electric valves are defective. 10 valves are drawn at random. Find the probability that at least two defective valves are found.

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40. Find the area of the region bounded by the parabola $y = x^2$ and y = |x|.

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41. Show that the pair of lines whose direction cosines are given by 3 lm-4ln+mn =0 and l+2m+3n = 0 are perpendicular to each other.

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