MATHS

BOOKS - UNITED BOOK HOUSE

SET 8

Exercise

1. For any one empty set A the identity mapping on A will be

A. bijective

B. surjactive but not injective

C. injective but not surjective

D. neither injective nor surjective

Answer:

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2. If $2\tan^{-1}x = \sin^{-1}K$ then the value of k is

A. $\frac{1-x^2}{1+x^2}$

B. $\frac{2x}{1-x^2}$

C. $\frac{2x}{1+x^2}$

D. $\frac{2x^2}{1+x^2}$

Answer:

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3. CHOOSE the correct answer from the following alternative :if two rows or two

columns of a determinant are identical then value of the determinant is

A. 1

B. 2

C. -1

D. 0

Answer:

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4. If f(2a-x)=-f(x), then $\int_0^{2a} f(x)dx=$

A. 1

B. 0

C. e

D. -1

Answer:

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5. If $f(x) = x + \frac{1}{x}$, x>0 then the greatest value of f(x) is (a) -2 (b)0 (c) 3 (d) none of these

A. -2

B. 0

C. 3

D. none of these

Answer:

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6. 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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7. the direction cosines of the line joining the points (1,2-3) and (-2,3,1) are

A. $-3, 1, 4$

B. $-1, 5, -2$

C. $-\frac{3}{\sqrt{26}}, \frac{1}{\sqrt{26}}, \frac{4}{\sqrt{26}}$

D. $-\frac{1}{\sqrt{30}}, \frac{5}{\sqrt{30}}, -\frac{2}{\sqrt{30}}$

Answer:

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8. If the probability of occurrence of an event is $\frac{5}{8}$ then the odds in fovour of the event are-

A. $5:13$

B. $5:3$

C. $3:5$

D. $8:13$

Answer:

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9. A fair coin is tossed 99 times. Let X be the number of times head occurs. The P(X=r) maximum when r is

A. 48

B. 52

C. 51

D. 50

Answer:

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10. Evaluate :

$$\sec^2\left(\tan^{-1}2\right)+\operatorname{cosec}^2\left(\cot^{-1}3\right).$$

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11. Prove that ,

$$\left|[1,\log_x^y,\log_x^z],\left[\log_y^x,1,\log_y^z\right],[\log_z^x,\log_z^y,1]\right|=0$$

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12. If $A = \begin{bmatrix} 2 & 2 \\ 4 & 3 \end{bmatrix}$ show that $AA^{-1} = I_2$ where I_2 is the unit matrix of order 2.

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13. $f(x) = \begin{cases} kx + 1 & x \leq \pi \\ \cos x & x > \pi \end{cases}$ If f(x) is continous at $x = \pi$ then find k.

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14. If $ye^y = x$ prove that $\frac{dy}{dx} = \frac{y}{x(1+y)}$

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15. Evaluate: $\int \frac{e^x}{x}(x \log x + 1)dx$

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16. Find the integrating factor of the differential equation $x \log x \frac{dy}{dx} + y = \frac{2}{x \log x}$.

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17. Find the acute angle between the pair of straight lines whose direction cosines are $\frac{\sqrt{3}}{4}, -\frac{1}{4}, -\frac{\sqrt{3}}{2}$ and $-\frac{\sqrt{3}}{4}, \frac{1}{4}, -\frac{\sqrt{3}}{2}$.

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18. Find the equation of the plane which passes through the points (1,2,3) ,(2,3,1) and (3,1,2).

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19. A random variable X has the following probability distribution:

x	4	5	6	8
probability	0·1	0·3	0·4	0·2

Find the expectation of the random variable X.

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20. If $\cos^{-1} x + \cos^{-1} y = \theta$, show that $x^2 - 2xy\cos\theta + y^2 = \sin^2\theta$.

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21. If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$ then prove that, AA'=I. Hence find A^{-1}.

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22. If $\tan y = \frac{\tan x + \sec x - 1}{\tan x - \sec x + 1}$ show that $\frac{dy}{dx} = \frac{1}{2}$

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23. Evaluate: $\int \frac{dx}{1 - \cos\alpha\cos x} \left(0 < \alpha < \frac{\pi}{2}\right)$

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24. Evaluate: $\int \frac{(\sin x + \cos x)dx}{\sin(x-a)}$

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25. The vectors $\vec{a}$ and $\vec{b}$ are non collinear. If $\vec{p} = (x+4y)\vec{a} + (2x+y+1)\vec{b}$ and $\vec{q} = (-2x+y+2)\vec{a} + (2x-3y-1)\vec{b}$ satisfy the relation $3\vec{p} = 2\vec{q}$ find the values of x and y.

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26. evaluate $\int_{-1}^{1} \frac{2x+3}{4} dx$

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27. Show that the standard deviation of a binomial distribution (with parameters n and p) cannot exceed $\sqrt{n}/2$.

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28. Prove that, a conical tent of given capacity will required the least amount of canvas, when the height is $\sqrt{2}$ times the radius of the base.

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29. Show that the normal at any point θ to the curve

$$x = a\cos\theta + a\theta\sin\theta,\ \ y = a\sin\theta - a\,\theta\cos\theta$$

is at a constant distance from the origin.

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