



MATHS

BOOKS - FULL MARKS MATHS (TAMIL ENGLISH)

SAMPLE PAPER 13

Part

1. If

$A = \{(x, y) : y = \sin x, x \in R\}$ and $B = \{(x, y) : y = \cos x, x \in R\}$

then $A \cap B$ contains

- A. no element
- B. infinitely many elements
- C. only one element

D. cannot be determined

Answer:

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2. For any two sets A and B , $(A - B) \cup (B - A) =$

A. $(A - B) \cup A$

B. $(B - A) \cup B$

C. $(A \cup B) - (A \cap B)$

D. $(A \cup B) \cap (A \cap B)$

Answer:

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3. If $|x + 2| \leq 9$, then x belongs to

A. $(-\infty, -7)$

B. $[-11, 7]$

C. $(-\infty, -7) \cup [11, \infty)$

D. $(-11, 7)$

Answer:



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4. The value of $2 \log 10 + 3 \log 2$ is

A. $\log 80$

B. $\log 800$

C. $\log 60$

D. $\log 400$

Answer:

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5. Sum of first 'n' terms of the series $\sqrt{2} + \sqrt{8} + \sqrt{18} + \dots$ is ___.

A. $\frac{n(n+1)}{2}$

B. $2n(n+1)$

C. $\frac{n(n+1)}{\sqrt{2}}$

D. 1

Answer:

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6. The coefficient of x^6 in $(2 + 2x)^{10}$ is

A. $10C_6$

B. 2^6

C. ${}^{16}C_6 2^6$

D. ${}^{10}C_6 2^{10}$

Answer:



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7. If ${}^n C_{10} > {}^n C_r$ for all possible r , then a value of n is

A. 10

B. 21

C. 19

D. 20

Answer:



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8. The point on the line $2x-3y=5$ is equidistance from $(1,2)$ and $(3,4)$ is

A. $(7,3)$

B. $(4,1)$

C. $(1,-1)$

D. $(3,4)$

Answer:



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9. The equation of the locus of the point whose distance from y-axis is half the distance from origin is

A. $x^2 + 3y^2 = 0$

B. $x^2 - 3y^2 = 0$

C. $3x^2 + y^2 = 0$

D. $3x^2 - y^2 = 0$

Answer:



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10. A root of the equation $\begin{vmatrix} 3-x & -6 & 3 \\ -6 & 3-x & 3 \\ 3 & 3 & -6-x \end{vmatrix} = 0$ is

A. 6

B. 3

C. 0

D. -6

Answer:



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11. If $\vec{a} = \hat{i} + 2\hat{j} + 2\hat{k}$, $|\vec{b}| = 5$ and the angle between \vec{a} and \vec{b} is $\frac{\pi}{6}$, then the area of the triangle formed by these two vectors as two sides is

A. $\frac{7}{4}$

B. $\frac{15}{4}$

C. $\frac{3}{4}$

D. $\frac{17}{4}$

Answer:



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12. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = 2\hat{i} + x\hat{j} + \hat{k}$, $\vec{c} = \hat{i} - \hat{j} + 4\hat{k}$ and $\vec{a} \cdot (\vec{b} \times \vec{c}) = 70$, then x is equal to

A. 5

B. 7

C. 26

D. 10

Answer:



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13. If $\lim_{x \rightarrow 0} \frac{\sin 3x}{\tan kx} = 5$ then the value of k is

A. $\frac{5}{3}$

B. $\frac{3}{11}$

C. 15

D. $\frac{3}{5}$

Answer:



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14. Find $Rf(0)$ for $f(x) = |x|$ is

A. x

B. 0

C. $-x$

D. 1

Answer:



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15. $\int \tan^{-1} \sqrt{\frac{1 - \cos 2x}{1 + \cos 2x}} dx$ is

A. $x^2 + c$

B. $2x^2 + c$

C. $x^2 / 2 + c$

D. $-x^2 / 2 + c$

Answer:



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16. $\int \frac{1}{\sqrt{3 + 4x}} dx =$

A. $\frac{1}{2}\sqrt{3+4x} + c$

B. $\frac{1}{2}\log\sqrt{3+4x} + c$

C. $2\sqrt{3+4x} + c$

D. $-\frac{1}{2}\sqrt{3+4x} + c$

Answer:



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17. Two items are chosen from a lot containing twelve items of which four are defective. Then the probability that atleast one of the item is defective

A. $\frac{19}{33}$

B. $\frac{17}{33}$

C. $\frac{23}{33}$

D. $\frac{13}{34}$

Answer:

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18. If $n(A) = 10$ and $n(A \cap B) = 3$, find $n((A \cap B)' \cap A)$.

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19. Are there two distinct irrational numbers such that their difference is a rational number? Justify.

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20. Find the value of $\tan 105^\circ$.

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21. Write the first 6 terms of the sequence whose n^{th} term is given

$$\text{by } t_n = \frac{3n - 2}{3^{n-1}}$$

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22. Show that the points $\left(0, -\frac{3}{2}\right)$, $(1, -1)$ and $\left(2, -\frac{1}{2}\right)$ are collinear.

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23. Find x and y if $\begin{pmatrix} 3x + 4y & x - 2y \\ 5 & -3 \end{pmatrix} = \begin{pmatrix} 2 & 4 \\ 5 & -3 \end{pmatrix}$.

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24.

Given

$\vec{a} = 2\hat{i} + 2\hat{j} + 3\hat{k}$, $\vec{b} = -\hat{i} + 2\hat{j} + \hat{k}$ and $\vec{c} = 3\hat{i} + \hat{j}$ such that $\vec{a} + \lambda\vec{b}$ is perpendicular to \vec{c} , then find the value of λ .



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25. Find the relation between a and b if $\lim_{x \rightarrow 3} f(x)$ exists where

$$f(x) = \begin{cases} ax + 1 & \text{if } x \leq 3 \\ bx + 3 & \text{if } x > 3 \end{cases}$$



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26. Find the derivative of $t^3 \cos t$ with respect to t .



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27. There are 15 candidates for an examination. 7 candidates are appearing for mathematics examination while the remaining 8 are appearing for different subjects. In how many ways can they be seated in a row so that no two mathematics candidates are together?

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28. Find the largest possible domain for the real valued function f defined by $f(x) = \sqrt{x^2 - 5x + 6}$.

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29. Resolve into partial fractions $\frac{3x + 7}{x^2 - 3x + 2}$.

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30. Iff ${}^5P_r = {}^6P_{r-1}$ find r.

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31. Show that
$$\begin{vmatrix} x & a & a \\ a & x & a \\ a & a & x \end{vmatrix} = (x + 2a)(x - a)^2$$

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32. Find the unit vectors perpendicular to each of the vectors

$\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$, where $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ and

$\vec{b} = \hat{i} + 2\hat{j} + 3\hat{k}$.

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33. Evaluate $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3}$ if it exists by finding $f(3^-)$ and $f(3^+)$.

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34. Prove that the equations to the straight lines through the origin each of which makes an angle α with the straight line $y = x$ is $x^2 - 2xy \sec 2\alpha + y^2 = 0$.

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35. Evaluate $\int \frac{1}{\sqrt{x+3} - \sqrt{x-4}} dx$.

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36. Prove that $\cos 5\theta = 16 \cos^5 \theta - 20 \cos^3 \theta + 5 \cos \theta$.



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37. Let $A=\{1,2,3,4\}$ and $B=\{a,b,c,d\}$. Give a function from $A \rightarrow B$ for each of the following:

- (i) neither one-to-one nor onto.
- (ii) not one-to-one but onto.
- (iii) one-to-one but not onto.
- (iv) one-to-one and onto



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38. Show that

$$\cos \frac{\pi}{15} \cos \frac{2\pi}{15} \cos \frac{3\pi}{15} \cos \frac{4\pi}{15} \cos \frac{5\pi}{15} \cos \frac{6\pi}{15} \cos \frac{7\pi}{15} = \frac{1}{128}.$$



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39. If x, y, z are respectively p^{th}, q^{th} and r^{th} terms of a G.P show that $x^{q-r} \times y^{r-p} \times z^{p-q} = 1$.

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40. Three vectors \vec{a}, \vec{b} and \vec{c} are such that $|\vec{a}| = 2, |\vec{b}| = 3, |\vec{c}| = 4$ and $\vec{a} + \vec{b} + \vec{c} = 0$ find $4\vec{a} \cdot \vec{b} + 3\vec{b} \cdot \vec{c} + 3\vec{c} \cdot \vec{a}$.

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41. Suppose the chances of hitting a target by a person X is 3 times in 4 shots, by Y is 4 times in 5 shots, and by Z is 2 times in 3 shots. They fire simultaneously exactly one time. what is the probability that the target is damaged by exactly 2 hits.

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42. Evaluate $\lim_{x \rightarrow \infty} \left(\frac{x^2 - 2x + 1}{x^2 - 4x + 2} \right)^x$

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43. (a) If $y = \cos(m \sin^{-1} x)$ prove that

$$(1 - x^2)y_3 - 3xy_2 + (m^2 - 1)y_1 = 0$$

(b) Find y'' if $x^4 + y^4 = 16$.

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