



MATHS

BOOKS - FULL MARKS MATHS (TAMIL ENGLISH)

SAMPLE PAPER-6 (UNSOLVED)

Part I

1. For non-empty sets A and B , if $A \subset B$ then $(A \times B) \cap (B \times A)$ is equal to

A. $A \cap B$

B. $A \times A$

C. $B \times B$

D. none of these

Answer:



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2. The solution set of the following inequality

$$|x - 1| \leq |x - 3| \text{ is}$$

A. $[0,2]$

B. $[2, \infty]$

C. $(0, 2)$

D. $(-\infty, 2)$

Answer:



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3. The number of solutions of $x^2 + |x - 1| = 1$ is

A. 1

B. 0

C. 2

D. 3

Answer:



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4. Which of the following is not true?

A. $\sin \theta = \frac{-3}{4}$

B. $\cos \theta = -1$

C. $\tan \theta = 25$

D. $\sec \theta = \frac{1}{4}$

Answer:



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5. Let $f_4(x) = \frac{1}{k} [\sin^k + \cos^k x]$ where $x \in \mathbb{R}$ and $k \geq 1$.

then $f_4(x) - f_6(x) =$

A. $\frac{1}{4}$

B. $\frac{1}{12}$

C. $\frac{1}{6}$

D. $\frac{1}{3}$

Answer:



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6. If A and B are coefficients of x^n in the expansion of $(1+x)^{2n}$ and $(1+x)^{2n-1}$ respectively then

$$\frac{A}{B} \dots\dots\dots$$

A. $\frac{1}{2}$

B. $\frac{1}{n}$

C. 1

D. 2

Answer:



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7. The value of ${}^{15}C_8 + {}^{15}C_9 - {}^{15}C_6 - {}^{15}C_7$ is,.....

A. 0

B. 1

C. 2

D. 3

Answer: A



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8. The slope of the line which makes an angle 45° with the line $3x - y = -5$ are

A. 1, -1

B. $\frac{1}{2}$, -2

C. 1, $\frac{1}{2}$

D. 2, $\frac{-1}{2}$

Answer:



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9. The sum of the binomial co-efficients is....

A. $2n$

B. 2^n

C. n^2

D. 1

Answer: B



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10. If the square of the matrix $\begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ is the unit matrix of order 2, then α, β and γ should satisfy the relation.

A. $1 + \alpha^2 + \beta\gamma = 0$

B. $1 - \alpha^2 - \beta\gamma = 0$

C. $1 - \alpha^2 + \beta\gamma = 0$

D. $1 + \alpha^2 - \beta\gamma = 0$

Answer:



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11. The value of x , for which the matrix $A =$

$$\begin{bmatrix} e^{x-2} & e^{7+x} \\ e^{2+x} & e^{2x+3} \end{bmatrix} \text{ is singular is}$$

A. 9

B. 8

C. 7

D. 6

Answer:



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12. If $A = \begin{bmatrix} \lambda & 1 \\ -1 & -\lambda \end{bmatrix}$, then for what value of λ , $A^2 = 0$?

A. 0

B. ± 1

C. -1

D. 1

Answer:



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13. $\lim_{x \rightarrow 0} \frac{xe^x - \sin x}{x}$ is

A. 1

B. 2

C. 3

D. 0

Answer:



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14. If the points whose position vectors $10\hat{i} + 3\hat{j}$, $12\hat{i} - 5\hat{j}$ and $a\hat{i} + 11\hat{j}$ are collinear then a is equal to

A. 3

B. 5

C. 6

D. 8

Answer:



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15.

If

$y = mx + c$ and $f(0) = f'(0) = 1$, then $f(2)$

is

A. 1

B. 2

C. 3

D. 4

Answer:



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16. $\lim_{x \rightarrow 1} \frac{e^x - e}{x - 1} = \dots\dots\dots$

A. 1

B. e

C. ∞

D. 0

Answer:



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17. $\int 2^{3x+5} dx$ is

A. $\frac{3(2^{3x+5})}{\log 2} + c$

B. $\frac{2^{3x+5}}{2 \log(3x+5)} + c$

C. $\frac{2^{3x+5}}{2 \log 3} + c$

D. $\frac{2^{3x+5}}{3 \log 2} + c$

Answer:



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18. $\int x^2 \cos x dx$ is:

A. $x^2 \sin x + 2x \cos x - 2 \sin x + c$

B. $x^2 \sin x - 2x \cos x - 2 \sin x + c$

C. $-x^2 \sin x + 2x \cos x + 2 \sin x + c$

D. $-x^2 \sin x - 2x \cos x + 2 \sin x + c$

Answer:



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19. $\int \frac{x}{1+x^2} dx = \dots\dots\dots$

A. $\tan^{-1} x + c$

B. $\log(1+x^2) + c$

C. $\log x + c$

D. $\frac{1}{2} \log(1+x^2) + c$

Answer:



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20. Ten coins are tossed. The probability of getting at least 8 heads is

A. $\frac{7}{64}$

B. $\frac{7}{32}$

C. $\frac{7}{128}$

D. $\frac{7}{16}$

Answer:



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Part ii

1. To secure A grade one must obtain an average of 90 marks or more in 5 subjects each of maximum 100 marks. If one scored 84,87,95,91 in first four subjects, what is the minimum mark one scored in the fifth subject to get A grade in the course?



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2. Prove that

$$(1 + \tan 1^\circ)(1 + \tan 2^\circ)(1 + \tan 3^\circ) \dots$$

$(1 + \tan 44^\circ)$ is multiple of 4.



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3. Find the distinct permutations of the letters or the word MISSISSIPPI ?



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4. Compute $|A|$ using Sarrus rule if

$$A = \begin{bmatrix} 3 & 4 & 1 \\ 0 & -1 & 2 \\ 5 & -2 & 6 \end{bmatrix}$$



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5. If $|\vec{a}| = 5$, $|\vec{b}| = 6$, $|\vec{c}| = 7$ and $\vec{a} + \vec{b} + \vec{c} = \vec{0}$, find $\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a}$.



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6. Find $\lim_{t \rightarrow 0} \frac{\sqrt{t^2 + 9} - 3}{t^2}$



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7. Find the derivatives of the following functions with respect to corresponding independent variables.

$$y = e^{-x} \log x$$

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8.
$$\frac{1}{\sqrt{1 - (4x)^2}}$$

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9. Nine coins are tossed once, find the probability to get at least two heads.



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10. If $P(a)$ denotes the Power set A and A is void set, then $n(P(P(P(a))))$ is:



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1. A simple cipher takes a number and codes it, using the function $f(x) = 3x - 4$. Find the inverse of this function, determine whether the inverse is also a function and verify the symmetrical property about the line $y = x$ (by drawing the lines).



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2. Show that $4 \sin A \sin(60^\circ + A) \cdot \sin(60^\circ - A) = \sin 3A$.



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3. How many strings of length 6 can be formed using letters of the word FLOWER if (i) either starts with F or ends with R?



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4. Find the distance of the line $4x - y = 0$ from the point P (4,1) measured along the line making an angle 135 degree with the positive x-axis.



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5. Using factor theorem prove that

$$\begin{vmatrix} x + 1 & 3 & 5 \\ 2 & x + 2 & 5 \\ 2 & 3 & x + 4 \end{vmatrix} = (x - 1)^2(x + 9)$$



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6. Find the unit vectors perpendicular to each of

the vectors $\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$, where

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



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7. If $y = \tan^{-1}\left(\frac{1+x^2}{1-x^2}\right)$ Find $\frac{dy}{dx}$.



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8. Evaluate: $\int \frac{dx}{\sqrt{1+x^2}}$



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9. If A and B are two events such that $P(A \cup B) = 0.7$, $P(A \cap B) = 0.2$, and $P(B) = 0.5$, then show that A and B are independent.



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10. Resolve the following rational expression into partial fractions.

$$\frac{2x^2 + 5x - 11}{x^2 + 2x - 3}$$



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Part IV

1. Prove that

$$\tan 70^\circ - \tan 20^\circ - 2\tan 40^\circ = 4\tan 10^\circ.$$

(b) In a $\triangle ABC$, if

$a = 2\sqrt{3}$, $b = 2\sqrt{2}$ and $C = 75^\circ$ find the other side and the angles.

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2. Use induction to prove that $n^3 - n + 3$, is divisible by 3, for all natural numbers n

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3. Show that $f(x) f(y) = f(x+y)$, where

$$f(x) = \begin{bmatrix} \cos x & -\sin x & 0 \\ \sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$





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4. Show that

$$\lim_{x \rightarrow \infty} \frac{1 + 2 + 3 + \dots + n}{3n^2 + 7n + 2} = \frac{1}{6}$$



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5. A man repays an amount of Rs.3250 by paying Rs.20 in the first month and then increases the payment by Rs.15 per month. How long will it take him to clear the amount?



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6. Evaluate $\int (x + 1)\sqrt{2x + 3}$

(b) Evaluate $\int \cos e c^3 x dx$



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