MATHS

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EXAMINATION QUESTION PAPER

MARCH 2019

Part I

1. $\int \frac{\sec x}{\sqrt{\cos 2x}} dx$ is

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

B. $\sin^{-1}(\tan x) + c$

C. $\tan^{-1}(\sin x) + c$

D. $2\sin^{-1}(\tan x) + c$

Answer:

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2. It is given that the events A and B are such that

$P(A) = \frac{1}{4}, P(A/B) = \frac{1}{2}$ and $P(B/A) = \frac{2}{3}$

. Then P(B) is

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

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

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

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

Answer:

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3. If $A = \left\{ \frac{x, y}{y} = e^x . x \in [0, \infty) \right\}$ and $B = \left\{ \frac{x, y}{y} = \sin x, x \in [0, \infty) \right\}$ then n(AcapB)` is?

A. ∞

B. 1

C. ϕ

D. 0

Answer:

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4. If $f(x) = \begin{cases} 2a - x, & \text{for} \quad -a < x < a \\ 3x - 2a, & \text{for} \quad x \geq a \end{cases}$

then which of the following is true?

A. $f(x)$ is continuous for all x in R

B. $f(x)$ is differentiable for all $x \geq a$

C. $f(x)$ is not differntiable at x=a

D. $f(x)$ is discontinuous at x=a

Answer:

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5. A number is selected from the set $\{1, 2, 3, \ldots, 20\}$. The probability That the selected number is divisible by 3 or 4 is

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

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

C. $\frac{2}{5}$

D. $\frac{1}{8}$

Answer:

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6. The value of x, for which the matrix A = $\begin{bmatrix} e^{x-2} & e^{7+x} \\ e^{2+x} & e^{2x+3} \end{bmatrix}$ is singular is

A. 7

B. 6

C. 9

D. 8

Answer:

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7. The number of five digit numbers in which all digits are even, is?

A. 4×5^4

B. 4×5^5

C. 5^5

D. 5×5

Answer:

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8. If $|x + 2| \leq 8$, then x belongs to?

A. (6,10)

B. (-10,6)

C. [-6,10]

D. [-10,-6]

Answer:

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9. The n^{th} term of the sequence 2, 7, 14, 23, ...is:

A. $n^2 + 2n + 1$

B. $n^2 + 2n - 1$

C. $n^2 - 2n - 1$

D. $n^2 - 2n + 1$

Answer:

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10. Straight line joining the points (2,3) and (-1,4) passes through the point (α, β) if

A. $\alpha + 3\beta = 11$

B. $3\alpha + \beta = 11$

C. $\alpha + 2\beta = 7$

D. $3\alpha + \beta = 11$

Answer:

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11. Let f: $\mathbb{R} \to \mathbb{R}$ be defined by f(x)=1 -|x|. Then the range of f is

A. $(-\infty, -5)$

B. $(-\infty, 5)$

C. $(-5, \infty)$

D. $(-5, \infty)$

Answer:

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12. The expansion of $(1-x)^{-2}$ is?

A. $1-x+x^2$-,...

B. $1+x+x^2+\ldots..$

C. $1-2x+3x^2-..$

D. $1+2x+3x^2+$

Answer:

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13. Which of the following is not a periodic function with period 2π?

A. $\tan x$

B. $\cos x$

C. $\sin x$

D. $\cos ecx$

Answer: A

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14. The line $\frac{x}{a} - \frac{y}{b} = 0$ has the slope 1,if:

A. $a = b$

B. *only* for $a = 1, b = 1$

C. $a > b$

D. $a < b$

Answer:

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15. Which one the following is not true about the matrix $[100000005]$?

A. an upper triangular matrix

B. a lower triangular matrix

C. a scalar matrix

D. a diagonal matrix

Answer:

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16. The unit vector parallel to the resultant of the vectors $\hat{i}+\hat{j}-\hat{k}$ and $\hat{i}-2\hat{j}+\hat{k}$is

A. $\frac{2\hat{i}-\hat{j}+\hat{k}}{\sqrt{5}}$

B. $\frac{2\hat{i}-\hat{j}}{\sqrt{5}}$

C. $\frac{\hat{i}-\hat{j}+\hat{k}}{\sqrt{5}}$

D. $\frac{2\hat{i}+\hat{j}}{\sqrt{5}}$

Answer:

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17. If $f(x) = x^2 - 3x$, then the points at which $f(x) = f'(x)$ are

A. both irrational

B. one rational and another irrational

C. both positive integers

D. both negative integers

Answer:

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18. If $\vec{a}$, $\vec{b}$ are the position vectors A and B then which one of the following points whose position vector lies on AB, is

A. $\frac{2\vec{a}+\vec{b}}{3}$

B. $\frac{\vec{a}-\vec{b}}{3}$

C. $\vec{a}+\vec{b}$

D. $\frac{2\vec{a}-\vec{b}}{2}$

Answer:

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Part Ii

1. Write the use of horizontal line test.

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2. Write the relationship between Permutation and Combination?

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3. Count the number of positive integers greater than 6000 and less than 7000 which are divisible by 5, provided that no digits are repeated?

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4. Find the separated equations from a combined equation of a straight line $2x^2 + xy - 3y^2 = 0$

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5. Define diagonal and scalar matrices?

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6. Find a unit vector along the directions of the vector $5\hat{i} - 3\hat{j} + 4\hat{k}$?

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7. Define a continuous function on the closed interval [a,b]

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8. Consider the function $f(x) = \sqrt{x}, x \geq 0$

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9. An integer is chosen at random from the first ten positive integers.Find the probability

that it is a multiple of three?

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10. Is it correct to say $A \times A = \{(a, a) : a \in A\}$? Justify your answer.

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Part Iii

1. A foot ball player can kick a football from ground level with an initial velocity of 80 ft/ second. Find the maximum horizontal distance the football travels and at what angle (Take g=32).

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2. Find the coefficient of x^3 in the expansion of $(2-3x)^7$?

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3. Find the nearest point on the line x - 2y- 5 from the origin.

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4. Prove that square matrix can be expressed as the sum of a symmetric matrix and a skew-symmetric matrix.

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5. If $\vec{a}, \vec{b}, \vec{c}$ are three vectors such that $\vec{a} + 2\vec{b} + \vec{c} = \vec{0}$ and $|\vec{a}| = 3, |\vec{b}| = 4, |\vec{c}| = 7$, find the angle between $\vec{a}$ and $\vec{b}$.

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6. Examine the continuity of the following :

$\cot x + \tan x$

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7. Differentiate the following :

$$y = \sin^{-1}\left(\frac{1-x^2}{1+x^2}\right)$$

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8. Find $\frac{dy}{dx}$ if x =a (t-sint),y=a(1-cos t)?

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9. Evaluate: $\int (x-3)\sqrt{x+2}dx.$

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10. Construct a suitable domain X such that $f: X \to N$ defined by $f(n) = n + 3$ to be one to one or onto?

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Part Iv

1. Write any five different forms of an equation of a straight line.

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2. (a) Solve the equation $\sqrt{6-4x-x^2} = x+4$ OR (b) Prove that in any ΔABC, $\Delta = \sqrt{\dfrac{(s-a)(s-b)}{s(s-c)}}$, where s is the semi - perimeter of ΔABC?

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3. (a) Prove that $\hat{} \; 3\sqrt{x^3+7} - {}^3\sqrt{x^3+4}$ is approcimately equal to $\dfrac{1}{x^2}$ when x is large. OR

(b) Find the unit vectors perpendicular to each of the vector $\vec{a} + \vec{b}$ 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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4. The chance X, Y and Z becoming managers of certain company and 4:2:3. the probabilities that bonus scheme will be introduced if X,Y and Z become managers are 0.3, 0.5 and 0.4 respectively? If the bonus scheme has been

introduced,What is the probability that Z was appointed as the manager?

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