MATHS

BOOKS - MCGROW HILL EDUCATION MATHS (HINGLISH)

JEE (MAIN) 2020 QUESTIONS (9TH JAN-AFTERNOON)

Jee Main 2020 Questions With Solutions Mathematics 9th Jan Afternoon

1. If $A = \{x \in R : |x| < 2\}$ and $B = \{x \in R : |x - 2| \geq 3\}$, then

A. $A - B = [-1, 2)$

B. $B - A = R - (-2, 5)$

C. $A \cup B = R - (2, 5)$

D. $A \cap B = (-2, -1)$

Answer: B

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2. If 10 different balls are to be placed in 4 distinct boxes at random, then the parobability that two of these boxes contain exactly 2 and 3 balls is :

A. $\frac{965}{2^{10}}$

B. $\frac{945}{2^{10}}$

C. $\frac{945}{2^{11}}$

D. $\frac{965}{2^{11}}$

Answer: B

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3. If $x = 2\sin\theta - \sin 2\theta$ and $y = 2\cos\theta - \cos 2\theta$, $\theta \in [0, 2\pi]$, then $\frac{d^2y}{dx^2}$ at $\theta = \pi$ is

A. $-\frac{3}{8}$

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

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

D. $-\frac{3}{4}$

Answer:

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4. Let f and g be differentiable functions on R such that fog is the identity function. If for some $a, b \in R, g'(a) = 5$ and $g(a) = b$, then $f'(b)$ is equal to :

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

B. $\frac{1}{5}$

C. 1

D. 5

Answer: D

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5. In the expansion of $\left(\frac{x}{\cos\theta}+\frac{1}{x\sin\theta}\right)$, if l_1 is the least value of the term independent of x when $\frac{\pi}{8}\leq\theta\leq\frac{\pi}{4}$ and l_2 is the least value of the term independent of x when $\frac{\pi}{16}\leq\theta\leq\frac{\pi}{8}$, then the value of $\frac{l_2}{l_1}$ is

A. $16:1$

B. $8:1$

C. $1:8$

D. $1:16$

Answer: A

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6. Let both root of equation $ax^2 - 2bx + 5 = 0$ are α and root of equation $x^2 - 2bx - 10 = 0$ are α and β . Find the value of $\alpha^2 + \beta^2$

A. 24

B. 25

C. 26

D. 28

Answer: B

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7. Let a function $f:[0,5] \to R$ be continuous, $f(1)=3$ and F be defined as :

$$F(x)=\int_1^x t^2 g(t)dt, \text{ where } g(t)=\int_1^t f(u)\mathrm{du}.$$

Then for the function F, the point $x=1$ is :

A. a point of inflection.

B. a point of local maxima.

C. a point of local minima.

D. not a critical point.

Answer: C

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8. Let $[t]$ denote the greatest integer $\leq t$ and $\lim_{x \to 0} x\left[\frac{4}{x}\right] = A$. Then the function, $f(x) = \left[x^2\right]\sin(\pi x)$ is discontinuous, when x is equal to :

A. $\sqrt{A+1}$

B. $\sqrt{A}$

C. $\sqrt{A+5}$

D. $\sqrt{A+21}$

Answer: A

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9. If $f(x) = \begin{vmatrix} x+a & x+2 & x+1 \\ x+b & x+3 & x+2 \\ x+c & x+4 & x+3 \end{vmatrix}$ and $a - 2b + c = 1$ then

A. $f(-50) = 501$

B. $f(-50) = -1$

C. $f(50) = 1$

D. $f(50) = -501$

Answer: C

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10. Given : $f(x)\begin{cases} x, & 0 \le x < \frac{1}{2} \\ \frac{1}{2}, & x = \frac{1}{2} \\ 1-x, & \frac{1}{2} < x \le 1 \end{cases}$ and $g(x) = \left(x - \frac{1}{2}\right)^2, x \in R$. Then the area (in sq. units) of the region bounded by the curves, $y = f(x)$ and $y = g(x)$ between the lines, $2x = 1$ and $2x = \sqrt{3}$, is :

A. $\frac{\sqrt{3}}{4} - \frac{1}{3}$

B. $\frac{1}{3} + \frac{\sqrt{3}}{4}$

C. $\frac{1}{2} + \frac{\sqrt{3}}{4}$

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

Answer: A

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11. If

$7x + 6y - 2z = 0, 3x + 4y + 2z = 0, x - 2y - 6z = 0$

then which option is correct

A. infinitely many solutions, (x,y,z) satisfying y = 2z.

B. infinitely many solutions, (x,y,z) satisfying x = 2z.

C. no solution

D. only the trivial solution.

Answer: B

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12. If $p \rightarrow (p \wedge \sim q)$ is false. Truth value of p & q will be

A. F, T

B. T, F

C. F, F

D. T, T

Answer: D

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13. The length of the minor axis (along the y-axis) of an ellipse in the standard form is $\frac{4}{\sqrt{3}}$ If this ellipse touches the line, $x + 6y = 8,$ then its eccentricity is :

A. $\frac{1}{2}\sqrt{\frac{5}{3}}$

B. $\frac{1}{2}\sqrt{\frac{11}{3}}$

C. $\sqrt{\frac{5}{6}}$

D. $\frac{1}{3}\sqrt{\frac{11}{3}}$

Answer: B

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14. z is a complex number such that $|Re(z)| + |Im(z)| = 4$ then $|z|$ can't be

A. $\sqrt{7}$

B. $\sqrt{17/2}$

C. $\sqrt{10}$

D. $\sqrt{8}$

Answer: A

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15. If $x \sum_{n=0}^{\infty}(-1)^n \tan^{2n}$ and $y = \sum_{n=0}^{\infty} \cos^{2n}\theta$ for $0 < \theta < \frac{\pi}{4}$, then :

A. $y(1+x) = 1$

B. $x(1-y) = 1$

C. $y(1-x) = 1$

D. $x(1+y) = 1$

Answer: C

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16. If $\frac{dx}{dy} = \frac{xy}{x^2 + y^2}$, $y(1) = 1$ and $y(x) = e$ then $x =$

A. $\sqrt{3e}$

B. $\sqrt{2e}$

C. $\frac{e}{\sqrt{2}}$

D. $\frac{1}{2}\sqrt{3e}$

Answer: A

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17. Let one end of focal chord of parabola $y^2 = 8x$ is (1/2, -2)`, then equation of tangent at other end of this focal chord is

A. $x + 2y + 8 = 0$

B. $2x - y - 24 = 0$

C. $x - 2y + 9 = 0$

D. $2x + y - 24 = 0$

Answer: C

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18. Let a_n is a positive term of a GP and $\sum_{n=1}^{100} a_{2n+1} = 200, \sum_{n=1}^{100} a_{2n} = 200,$ find `sum_(n=1)^200 a_(2n) =?

A. 300

B. 175

C. 225

D. 150

Answer: D

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19. Let probability distribution is

$$\begin{bmatrix} x_i & : & 1 & 2 & 3 & 4 & 5 \\ p_i & : & k^2 & 2k & k & 2k & 5k^2 \end{bmatrix}$$ then value of $p(x > 2)$ is

A. $7/12$

B. $23/36$

C. $1/36$

D. $1/6$

Answer: B

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20.

$$\int \left(\frac{d(\theta)}{(\cos^2\theta)(\sec(2\theta) + \tan(2\theta))} \right) = \lambda \tan\theta + 2\log f(x) + c$$

, then ordered pair $(\lambda, f(x))$ is

A. $(-1, 1-\tan\theta)$

B. $(-1, 1+\tan\theta)$

C. $(1, 1+\tan\theta)$

D. $(1, 1-\tan\theta)$

Answer: B

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21. Let $\vec{a}, \vec{b}$ and $\vec{c}$ be three vectors such that $\left|\vec{a}\right| = \sqrt{3}, \left|\vec{b}\right| = 5, \vec{b}.\vec{c} = 10$ and the angle between $\vec{b}$ and $\vec{c}$ $is\frac{\pi}{3}$, if $\vec{a}$ is perpendicular to the vector $\vec{b} \times \vec{c}$, $then$|veca xx (vecaxxvecc)|` is equal to _____.

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22. If $C_r = {}^{25}C_r$ and $C_0 + 5 \cdot C_1 + 9 \cdot C_2 + \ldots + (101) \cdot C_{25} = 225 \cdot k$, then k is equal to _____.

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23. If the curves $x^2 - 6x + y^2 + 8 = 0$ and $x^2 - 8y + y^2 + 16 - k = 0, (k > 0)$ touch each other at a point , then the largest value of k is _____.

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24. Find the number of terms common to the two AP's 3,7,11,15.... 407 and 2, 9 ,16.....709.

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25. If the distance between the plane 23,-10y-2z+48 =0 and the plane containing the lines $\frac{x+1}{2}=\frac{y-3}{4}=\frac{z+1}{3}$ and $\frac{x+3}{2}=\frac{y+2}{6}=\frac{z-1}{\lambda}(\lambda \in R)$ is equal to $\frac{k}{\sqrt{633}}$, then k is equal to _____.

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