MATHS

BOOKS - MCGROW HILL EDUCATION MATHS (HINGLISH)

JEE (MAIN) QUESTIONS WITH SOLUTIONS MATHEMATICS (7 TH JAN-MORNING)

Questions

1. The area that is enclosed in the circle $x^2 + y^2 = 2$ which is not common enclosed by $y = x \& y^2 - x$ is

A. $\frac{1}{3}(12\pi - 1)$

B. $\frac{1}{6}(12\pi - 1)$

C. $\frac{1}{3}(6\pi - 1)$

D. $\frac{1}{6}(24\pi - 1)$

Answer: B

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2. Total number of 6-digit numbers in which only and all the five digit 1,2,5,7 and 9 appear, is :

A. 56

B. 6!

C. $\frac{1}{2}(6!)$

D. $\frac{5}{2}(6!)$

Answer: D

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3. An unbaised coin is thrown 5 times. Let X be a random variable and k be the value of assigned to X for k=3,4,5 times Head occurs consecutively and

otherwise the value of X is assigned -1. What is value of expection.

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

B. $\frac{3}{16}$

C. $-\frac{1}{8}$

D. $-\frac{3}{16}$

Answer: A

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4. If Re $\left(\frac{x-1}{2z+i}\right) = 1$, where $z = x + iy$, then the point (x,y) lies on a :

A. circle whose centre is at $(-1/2, -3/2)$.

B. straight line whose slope is $3/2$.

C. circle whose diameter is $\sqrt{5}/2$

D. straight line whose slope is $-2/3$.

Answer: C

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5. If $f(a+b+1-x)=f(x)$, for all x where a and b are fixed positive real numbers, the $\frac{1}{a+b}\int_a^b x(f(x)+f(x+1)\,dx$ is equal to :

A. $\int_{a-1}^{b-1} f(x)dx$

B. $\int_{a+1}^{b+1} f(x+1)dx$

C. $\int_{a-1}^{b-1} f(x+1)dx$

D. $\int_{a+1}^{b+1} f(x)dx$

Answer: D

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6. If distance between the foci of an ellipse is 6 and distance between its directionces is 12, then length of its latus rectum is

A. $2\sqrt{3}$

B. $\sqrt{3}$

C. $3/\sqrt{2}$

D. $3\sqrt{2}$

Answer: D

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7. The logical statement $(p \to q) \vee (q \to \sim p)$ is :

A. $\sim p$

B. p

C. q

D. $\sim q$

Answer: A

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8. Find the greatest value of k for which $49^k + 1$ is a factor of $1 + 49 + 49^2 \ldots . (49)^{125}$

A. 32

B. 60

C. 65

D. 63

Answer: D

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9. The vector $\vec{a} = \alpha\hat{i} + 2\hat{j} + \beta\hat{k}$ lies in the plane of the vectors $\vec{b} = \hat{i} + \hat{j}$ and $\vec{c} = \hat{j} + \hat{k}$ and bisects the angle between $\vec{b}$ and $\vec{c}$. Then which one of the following gives possible values of $\alpha \text{and} \beta$? (1) $\alpha = 2, \beta = 2$ (2) $\alpha = 1, \beta = 2$ (3) $\alpha = 2, \beta = 1$ (4) $\alpha = 1, \beta = 1$

A. $a \cdot i + 3 = 0$

B. $a \cdot k + 4 = 0$

C. $a \cdot i + 1 = 0$

D. $a \cdot k + 2 = 0$

Answer: D

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10.

If $y = \sqrt{\frac{2(\tan\alpha + \cot\alpha)}{1 + \tan^2\alpha} + \frac{1}{\sin^2\alpha}}$ when $\alpha \in \left(\frac{3\pi}{4}, \pi\right)$ then find $\frac{dy}{d\alpha}$

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

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

C. 4

D. -4

Answer: C

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11. If $y = mx + 4$ is a tangent to both the parabolas, $y^2 = 4x$ and $x^2 = 2by$, then b is equal to :

A. -64

B. 128

C. -128

D. -32

Answer: C

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12. Let α be a root of the equation $x^2 + x + 1 = 0$ and the matrix

$$A = \frac{1}{\sqrt{3}} \begin{bmatrix} 1 & 1 & 1 \\ 1 & \alpha & \alpha^2 \\ 1 & \alpha^2 & \alpha^4 \end{bmatrix}$$

then the matrix A^{31} is equal to :

A. A

B. A^2

C. A^3

D. I_3

Answer: C

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13. If $g(x) = x^2 + x + x - 1$ and $g(f(x)) = 4x^2 - 10x + 5$ then find $f\left(\frac{5}{4}\right)$

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

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

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

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

Answer: B

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14. If α and β are the roots of equation (k+1) $\tan^2 x - \sqrt{2}\lambda, \tan = 1 - k$ and $\tan^2(\alpha + \beta) = 50$. Find the value of λ

A. $5\sqrt{2}$

B. $10\sqrt{2}$

C. 10

D. 5

Answer: C

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15. Let P be a plane passing through the points (2,1,0) (4,1,1) and (5,0,1) and R be any point (2,1,6) . Then the image of R in the plane P is :

A. (6,5,2)

B. (6,5,-2)

C. (4,3,2)

D. (3,4,-2)

Answer: B

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16. Let y=f(x) is a solution of differential equation $e^y\left(\frac{dy}{dx}-1\right)=e^x$ and f(0)=0 then f(1) is equal to

A. $1/3$

B. $3/2$

C. $2/3$

D. $4/3$

Answer: C

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17. Let the function, $f:[-7,0] \to R$ be continuous on $[-7,0]$ and differentiable on $(-7,0)$. If $f(-7) = -3$ and $f'(x) \leq 2$, for all $x \in (-7,0)$, then for all such functions f, $f(-1)+f(0)$ lies in the interval :

A. $[-6,20]$

B. $(-\infty,20]$

C. $(-\infty,11]$

D. $[-3,11]$

Answer: B

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18. Let y=f(x) is a solution of differential equation $e^y\left(\frac{dy}{dx}-1\right)=e^x$ and f(0)=0 then f(1) is equal to

A. $\log_e 2$

B. $2e$

C. $2 + \log_e 2$

D. $1 + \log_e 2$

Answer: D

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19. Five numbers are in A.P., whose sum is 25 and product is 2520. If one of these five numbers if $-\frac{1}{2}$, then the greatest number amongst them is :

A. 16

B. 27

C. 7

D. $21/2$

Answer: A

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20. If the system of linear equations

$2x + 2ay + az = 0$

$2x + 3by + bz = 0$

$2x + 4cy + cz = 0$

where a,b,c $\in$ R are non - zero and distinct , has a non-zero solution, then :

A. $a + b + c = 0$

B. a,b,c are in A.P.

C. $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P.

D. a,b,c are in G.P.

Answer: C

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21. $\lim_{x \to 2} \frac{3^x + 3^{3-x} - 12}{3^{-x/2} - 3^{1-x}}$ is equal to _____

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22. If the variance of the first n natural numbers is 10 and the variance of the first m even natural numbers is 16, then $m + n$ is equal to _____ .

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23. If sum of all the coefficient of even powers in $(1 - x + x^2 - x^3 .... x^{2x})(1 + x + x^3 .... + x^{2n})$ is 61 then n is equal to

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24. If f(x)=|2-|x-3|| is non differentiable in $X \in S$. Then value of $\sum_{x \in S} (f(f(x))$ is

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25. Let $A(1, 0)$, $B(6, 2)$ and $C\left(\frac{3}{2}, 6\right)$ be the vertices of a triangle ABC. If P is a point inside the triangle ABC such that the triangles APC, APB and BPC have equal areas , then the length of the line segment PQ, where Q is the point $\left(-\frac{7}{6}, -\frac{1}{3}\right)$, is _____.

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