MATHS

BOOKS - MTG MATHS (BENGALI ENGLISH)

QUESTION PAPER 2013

Multiple Choice Questions

1. A point P lies on the circle $x^2 + y^2 = 169$. If $Q = (5, 12)$ and $R = (-12, 5)$, then the angle $\angle QPR$ is

A. $\frac{\pi}{6}$

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

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

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

Answer:

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2. A circle passing through (0, 0), (2, 6), (6, 2) cuts the x-axis at the point $P \neq (0, 0)$. Then the length of OP, when O is the origin, is

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

B. $\frac{5}{\sqrt{2}}$

C. 5

D. 10

Answer:

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3. The locus of the midpoints of the chords of an ellipse $x^2 + 4y^2 = 4$ that are drawn from the positive end of the minor axis, is

A. a circle with centre $\left(\frac{1}{2}, 0\right)$ and radius 1

B. a parabola with focus $\left(\frac{1}{2}, 0\right)$ and directrix $x = -1$

C. an ellipse with centre $\left(0, \frac{1}{2}\right)$, major axis 1 and minor axis $\frac{1}{2}$

D. a hyperbola with centre $\left(0, \frac{1}{2}\right)$, transverse axis 1 and conjugate axis $\frac{1}{2}$

Answer:

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4. A point moves so that the sum of squares of its distances from the points (1, 2) and $(-2, 1)$ is always 6. Then its locus is

A. the straight line $y - \frac{3}{2} = -3\left(x + \frac{1}{2}\right)$

B. a circle with centre $\left(-\frac{1}{2}, \frac{3}{2}\right)$ and radius $\frac{1}{\sqrt{2}}$

C. a parabola with focus (1, 2) and directrix passing through $(-2, 1)$

D. an ellipse with foci (1, 2) and $(-2, 1)$

Answer:

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5. For the variable t, the locus of the points of intersection of lines $x - 2y = t$ and $x + 2y = \frac{1}{t}$ is

A. the straight line x = y

B. the circle with centre at the origin and radius 1

C. the ellipse with centre at the origin and one focus $\left(\frac{2}{\sqrt{5}}, 0\right)$

D. the hyperbola with centre at the origin and one focus $\left(\frac{\sqrt{5}}{2}, 0\right)$

Answer:

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6. Let $P = \begin{pmatrix} \cos\frac{\pi}{4} & -\sin\frac{\pi}{4} \\ \sin\frac{\pi}{4} & \cos\frac{\pi}{4} \end{pmatrix}$ and $X = \begin{pmatrix} \frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{pmatrix}$. Then P^3X is equal to

A. $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$

B. $\begin{pmatrix} -\frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{pmatrix}$

C. $\begin{pmatrix} -1 \\ 0 \end{pmatrix}$

D. $\begin{pmatrix} -\frac{1}{\sqrt{2}} \\ -\frac{1}{\sqrt{2}} \end{pmatrix}$

Answer:

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7. The number of solutions of the equation $x + y + z = 10$ in positive integers x, y, z, is equal to

A. 36

B. 55

C. 72

D. 45

Answer:

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8. For $0 \leq P, Q \leq \frac{\pi}{2}$, if $\sin P + \cos Q = 2$, then the value of $\tan\left(\frac{P+Q}{2}\right)$ is equal to

A. 1

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

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

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

Answer:

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9. If α and β are the roots of $x^2 - x + 1 = 0$, then the value of $\alpha^{2013} + \beta^{2013}$ is equal to

A. 2

B. -2

C. -1

D. 1

Answer:

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10. The value of the integral $\int_{-1}^{+1}\left\{\frac{x^{2013}}{e^{|x|}(x^2+\cos x)}+\frac{1}{e^{|x|}}\right\}dx$ is equal to

A. 0

B. $1-e^{-1}$

C. $2e^{-1}$

D. $2(1-e^{-1})$

Answer:

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11. Let

$f(x) = 2^{100}x + 1,$

$g(x) = 3^{100}x + 1.$

Then the set of real numbers x such that $f(g(x)) = x$ is

A. empty

B. a singleton

C. a finite set with more than one element

D. infinite

Answer:

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12. The limit of $x\sin\left(e^{1/x}\right)$ as $x \to 0$

A. is equal to 0

B. is equal to 1

C. is equal to e/2

D. does not exist

Answer:

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13. Let $I = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ and $P = \begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -2 \end{pmatrix}$. Then the matrix $P^3 + 2P^2$ is equal to

A. P

B. $I - P$

C. $2I + P$

D. $2I - P$

Answer:

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14. If α, β are the roots of the quadratic $x^2 + ax + b = 0, (b \neq 0)$, then the quadratic equation whose roots are $\alpha - \frac{1}{\beta}, \beta - \frac{1}{\alpha}$ is

A. $ax^2 + a(b-1)x + (a-1)^2 = 0$

B. $bx^2 + a(b-1)x + (b\text{~}1)^2 = 0$

C. $x^2 + ax + b = 0$

D. $abx^2 + bx + a = 0$

Answer:

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15. The value of $1000\left[\frac{1}{1\times 2} + \frac{1}{2\times 3} + \frac{1}{3\times 4} + \ldots\ldots + \frac{1}{999\times 1000}\right]$ is equal to

A. 1000

B. 999

C. 1001

D. 1/999

Answer:

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16. The value of the determinant $\begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix}$ is equal to

A. 0

B. $(1+a^2+b^2)$

C. $(1+a^2+b^2)^2$

D. $(1+a^2+b^2)^3$

Answer:

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17. If the distance between the foci of an ellipse is equal to length of the latus rectum, then its eccentricity is

A. $\frac{1}{4}(\sqrt{5}-1)$

B. $\frac{1}{2}(\sqrt{5}+1)$

C. $\frac{1}{2}(\sqrt{5}-1)$

D. $\frac{1}{4}(\sqrt{5}+1)$

Answer:

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18. For the curve $x^2+4xy+8y^2=64$ the tangents are parallel to the x-axis only at the points

A. $(0, 2\sqrt{2})$ and $(0, -2\sqrt{2})$

B. $(8, \ -4)$ and $(-8, 4)$

C. $(8\sqrt{2}, \ -2\sqrt{2})$ and $(-8\sqrt{2}, 2\sqrt{2})$

D. (8, 0) and $(-8, 0)$

Answer:

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19. The value of $I = \int_0^{\frac{\pi}{4}} (\tan^{n+1} x) dx + \frac{1}{2}\int_0^{\frac{\pi}{2}} \tan^{n-1}(x/2) dx$ is equal to

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

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

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

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

Answer:

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20. Let $f(\theta) = (1 + \sin^2 \theta)(2 - \sin^2 \theta)$. Then for all values of θ.

A. $f(\theta) > \frac{9}{4}$

B. $f(\theta) < 2$

C. $f(\theta) > \frac{11}{4}$

D. $2 \leq f(\theta) \leq \frac{9}{4}$

Answer:

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21. Let $f(x) = \begin{cases} x^3 - 3x + 2, & x < 2 \\ x^3 - 6x^2 + 9x + 2, & x \geq 2 \end{cases}$ Then

A. $\lim_{x \to 2} f(x)$ does not exist

B. f is not continuous at x = 2

C. f is continuous but not differentiable at x = 2

D. f is contunuous and differentiable at x = 2

Answer:

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22. The limit of $\sum_{n=1}^{1000}(-1)^{e}x^{e}$ as $x \to \infty$

A. does not exist

B. exists and equals to 0

C. exists and approaches $+\infty$

D. exists and approaches $-\infty$

Answer:

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23. If $f(x)=e^{x}(x-2)^{2}$ then

A. f is increasing in $(-\infty, 0)$ and $(2, \infty)$ and decreasing in (0, 2)

B. f is increasing in $(-\infty, 0)$ and decreasing in $(0, \infty)$

C. f is increasing in $(2, \infty)$ and decreasing in $(-\infty, 0)$

D. f is increasing in (0, 2) and decreasing in $(-\infty, 0)$ and $(2, \infty)$

Answer:

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24. Let $f: R \rightarrow R$ be such that f is injective and $f(x)f(y) = f(x+y)$ for all $x, y \in R$, If $f(x), f(y), f(z)$ are in G.P., then x,y,z are in

A. A.P. always

B. G.P. always

C. A.P. depending on the values of x, y, z

D. G.P. depending on the values of x, y, z

Answer:

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25. The number of solutions of the equation $\frac{1}{2}\log_{\sqrt{3}}\left(\frac{x+1}{x+5}\right)+\log_9(x+5)^2=1$ is

A. 0

B. 1

C. 2

D. infinite

Answer:

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26. The area of the region bounded by the parabola $y=x^2-4x+5$ and the straight line $y=x+1$ is.

A. $1/2$

B. 2

C. 3

D. $9/2$

Answer:

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27. The value of the integral $\int_1^2 e^{-x}\left(\log_e x + \frac{x+1}{x}\right)dx$ is

A. $e^2(1 + \log_e 2)$

B. $e^2 - e$

C. $e^2(1 + \log_e 2) - e$

D. $e^2 - e(1 + \log_e 2)$

Answer:

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28. Let $P = 1 + \frac{1}{2 \times 2} + \frac{1}{3 \times 2^2} + ...$

and $Q = \frac{1}{1 \times 2} + \frac{1}{3 \times 4} + \frac{1}{5 \times 6} + ...$

Then

A. P = Q

B. 2P = Q

C. P = 2Q

D. P = 4Q

Answer:

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29. Let $f(x) = \sin x + 2\cos^2 x, \frac{\pi}{4} \le x \le \frac{3\pi}{4}$. Then f attains its

A. minimum at $x = \frac{\pi}{4}$

B. maximum at $x = \frac{\pi}{2}$

C. minimum at $x = \frac{\pi}{2}$

D. maximum at $x = \sin^{-1}\left(\frac{1}{4}\right)$

Answer:

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30. Each of a and b can take value 1 or 2 with probability. The probability that the equation $ax^2 + bx + 1 = 0$ has real roots, is equal to

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

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

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

D. $\frac{1}{16}$

Answer:

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31. There are two coins, one unbiased with probability $\frac{1}{2}$ of getting heads and the other one is biased with probability $\frac{3}{4}$ of getting heads. A coin is selected at random and tossed. It shows heads up. Then the probability that the unbiased coin was selected is

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

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

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

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

Answer:

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32. For the variable t, the locus of the points of intersection of lines $3tx - 2y + 6t = 0$ and $3x + 2ty - 6 = 0$ is

A. the ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1$

B. the elliplase $\frac{x^2}{9} + \frac{y^2}{4} = 1$

C. the ellipse $\frac{x^2}{4} - \frac{y^2}{9} = 1$

D. the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$

Answer:

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33. Cards are drawn one - by - one without replacement from a well shuffled pack of 52 cards. Then the probability that a face card (Jack, Queen or King) will appear for the first time on the third turn is equal to

A. $\frac{300}{2197}$

B. $\frac{36}{85}$

C. $\frac{12}{85}$

D. $\frac{4}{51}$

Answer:

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34. Lines $x+y=1$ and $3y=x+3$ intersect the ellipse $x^2+9y^2=9$ at the points P, Q, R. The area of the triangle PQR is

A. $\frac{36}{5}$

B. $\frac{18}{5}$

C. $\frac{9}{5}$

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

Answer:

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35. The number of onto functions from the set $\{1, 2, \ldots\ldots\ldots, 11\}$ to the set $\{1, 2, \ldots\ldots\ldots, 10\}$ is

A. $5 \times \underline{|11}$

B. $\lfloor 10$

C. $\dfrac{\lfloor 11}{2}$

D. $10 \times \lfloor 11$

Answer:

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36. The limit of $\left[\dfrac{1}{x^2} + \dfrac{(2013)^x}{e^x - 1} - \dfrac{1}{e^x - 1}\right]$ as $x \to 0$

A. approaches $+\infty$

B. approaches $-\infty$

C. is equal to $\log_e(2013)$

D. does not exist

Answer:

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37. Let $z_1 = 2 + 3i$ and $z_2 = 3 + 4i$ be two points on the complex plane. Then the set of complex numbers z satisfying $|z - z_1|^2 + |z - z_2|^2 = |z_1 - z_2|^2$ represents

A. a straight line

B. a point

C. a circle

D. a pair of straight lines

Answer:

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38. Let p (x) be a quardractic polynomial constant term 1. Suppose p (x) when divided by $x - 1$ leaves remainder 2 and when divided by $x + 1$ leaves remainder 4. Then the sum of the roots of p (x) = 0 is

A. -1

B. 1

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

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

Answer:

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39. Eleven apples are distributed among a girl and a boy. Then which one of the following statements is true ?

A. At least one of them will receive 7 apples

B. The girl receives at least 4 apples or the boy receives at boy receives at least 9 apples

C. The girl receives at least 5 apples or the boy receives at least 8 apples

D. The girl receives at least 4 apples or the boy receives at least 8 apples

Answer:

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40. Five numbers are in H.P. The middle term is 1 and the ratio of the second and the fourth terms is 2 : 1. Then the sum of the first three terms is

A. $\frac{11}{2}$

B. 5

C. 2

D. $14/3$

Answer:

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41. The limit of $\left\{\frac{1}{x}\sqrt{1+x} - \sqrt{1+\frac{1}{x^2}}\right\}$ as $x \to 0$

A. does not exist

B. is equal to 1/2

C. is equal to 0

D. is equalto 1

Answer:

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42. The maximum and minimum values of $\cos^6\theta + \sin^6\theta$ are respectively

A. 1 and 1/4

B. 1 and 0

C. 2 and 0

D. 1 and 1/2

Answer:

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43. If a, b, c are in A.P., then the straight line $ax + 2by + c = 0$ will always pass through a fixed point whose co-ordinates are

A. $(1, -1)$

B. $(-1, 1)$

C. $(1, -2)$

D. $(-2, 1)$

Answer:

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44. If one end of a diameter of the circle $3x^2 + 3y^2 - 9x + 6y + 5 = 0$ is (1, 2), then the other end is

A. $(2, 1)$

B. $(2, 4)$

C. $(2, -4)$

D. $(-4, 2)$

Answer:

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45. The value of $\cos^2 75^\circ + \cos^2 45^\circ + \cos^2 15^\circ - \cos^2 30^\circ - \cos^2 60^\circ$ is

A. 0

B. 1

C. $1/2$

D. $1/4$

Answer:

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46. Suppose $z = x + iy$ where x and y are real numbers and $i = \sqrt{-1}$.

The points (x, y) for which $\frac{z-1}{z-i}$ is real, lie on

A. an ellipse

B. a circle

C. a parabola

D. a straight line

Answer:

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47. The equation $2x^2 + 5xy - 12y^2 = 0$ represents a

A. circle

B. pair of non - perpendicular intersecting straight lines

C. pair of perpendicular straight lines

D. hyperbola

Answer:

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48. The line $y = x$ intersects the hyperbola $\frac{x^2}{9} - \frac{y^2}{25} = 1$ at the points P and Q. The eccentricity of ellipse with PQ as major axis and minor axis of length $\frac{5}{\sqrt{2}}$ is

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

B. $\frac{5}{\sqrt{3}}$

C. $\frac{5}{9}$

D. $\frac{25}{9}$

Answer:

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49. The equation of the circle passing through the point (1, 1) and the points of intersection of $x^2 + y^2 - 6x - 8 = 0$ and $x^2 + y^2 - 6 = 0$ is

A. $x^2 + y^2 + 3x - 5 = 0$

B. $x^2 + y^2 - 4x + 2 = 0$

C. $x^2 + y^2 + 6x - 4 = 0$

D. $x^2 + y^2 - 4y - 2 = 0$

Answer:

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50. Six positive numbers are in G.P., such that their product is 1000. If the fourth term is 1, then the last term is

A. 1000

B. 100

C. 1/100

D. 1/1000

Answer:

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51. In the set of all 3×3 real matrices a relation is defined as follows. A matrix A. is related to matrix B if and only if there is a non - singular 3×3 matrix P such that $B = P^{-1}AP$. This relation is

A. Reflexive, Symmetric but not Transitive

B. Reflexive, Transitive but not Symmetric

C. Symmetric, Transitive but not Reflexive

D. an Equivalence relation

Answer:

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52. The number of lines which pass through the point $(2, -3)$ and are a distance 8 from the point $(-1, 2)$ is

A. infinite

B. 4

C. 2

D. 0

Answer:

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53. If α, β are the roots of the quadratic equation $ax^2 + bx + c = 0$ and $3b^2 = 16ac$ then

A. $\alpha = 4\beta$ or $\beta = 4\alpha$

B. $\alpha = -4\beta$ or $\beta = -4\alpha$

C. $\alpha = 3\beta$ or $\beta = 3\alpha$

D. $\alpha = -3\beta$ or $\beta = -3\alpha$

Answer:

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54. For any two real numbers a and b, we define a R b if and only if $\sin^2 a + \cos^2 b = 1$. The relation R is

A. Reflexive but not Symmetric

B. Symmetric but not Transitive

C. Transitive but not Reflexive

D. an Equivalence relation

Answer:

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55. Let n be a positive even integer. The ratio of the largest coefficient and the 2^{nd} largest coefficient in the expansion of $(1+x)^n$ is 11 : 10. Then the number of terms in the expansion of

A. 20

B. 21

C. 10

D. 11

Answer:

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56. Let exp (x) denote the exponential function e^x. If $f(x) = \exp\left(x^{\frac{1}{x}}\right), x > 0$, then the minimum value of f in the interval [2, 5] is

A. $\exp\left(e^{\frac{1}{e}}\right)$

B. $\exp\left(2^{\frac{1}{2}}\right)$

C. $\exp\left(5^{\frac{1}{5}}\right)$

D. $\exp\left(3^{\frac{1}{2}}\right)$

Answer:

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57. The sum of the series $\frac{1}{1 \times 2}{}^{25}C_0 + \frac{1}{2 \times 3}{}^{25}C_1 + \frac{1}{3 \times 4}{}^{25}C_2 + \ldots\ldots + \frac{1}{26 + 27}{}^{25}C_{25}$

A. $\frac{2^{27} - 1}{26 \times 27}$

B. $\frac{2^{27} - 28}{26 \times 27}$

C. $\frac{1}{2}\left(\frac{2^{26} + 1}{26 \times 27}\right)$

D. $\frac{2^{26} - 1}{52}$

Answer:

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58. Five numbers are in A.P, with common difference $\neq 0$. If the $1^{st}, 3^{rd}$ and 4^{th} terms are in G.P., then

A. the 5^{th} term is always 0

B. the 1^{st} term is always 0

C. the middle term is always 0

D. the middle term is always -2

Answer:

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59. The minimum value of the function $f(x) = 2|x-1| + |x-2|$ is

A. 0

B. 1

C. 2

D. 3

Answer:

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60. If P, Q, R are angles of an isoseles triangle and $\angle P = \frac{\pi}{2}$, then the value of

$$\left(\cos\frac{P}{3} - \text{i}\sin\frac{P}{3}\right)^2 + (\cos Q + \sin Q)(\cos R - i\sin R) + (\cos P - i\sin P$$

is equal to

A. i

B. $-i$

C. 1

D. -1

Answer:

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61. A line passing through the point of intersection of $x + y = 4$ and $x - y = 2$ makes an angle $\tan^{-1}(3/4)$ with the x - axis. It intersects the parabola $y^2 = 4(x - 3)$ at points (x_1, y_1) and (x_2, y_2) respectively. Then $[x_1 - x_2]$ is equal to

A. $\frac{16}{9}$

B. $\frac{32}{9}$

C. $\frac{40}{9}$

D. $\frac{80}{9}$

Answer:

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62. Let $[a]$ denote the greatest integer which is less than or equal to a. Then the value of the integral $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} [\sin x \cos x] dx$ is

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

B. π

C. $-\pi$

D. $-\pi/2$

Answer:

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63. If $P=((2, -2, -4), (-1.3, 4), (1, -2, -3))$, then P^5 equals.

A. P

B. 2P

C. $-P$

D. $-2P$

Answer:

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64. If $\sin^2\theta + 3\cos\theta = 2$, then $\cos^3\theta + \sec^3\theta$ is

A. 1

B. 4

C. 9

D. 18

Answer:

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65. Let $x = 1 + \frac{1}{2 \times \lfloor 1} + \frac{1}{4 \times \lfloor 2} + \frac{1}{8 \times \lfloor 3} + ...$

and $y = 1 + \frac{x^2}{\lfloor 1} + \frac{x^4}{\lfloor 2} + \frac{x^6}{\lfloor 3} + ...$

Then the value of $\log_e y$ is

A. e

B. e^2

C. 1

D. 1/e

Answer:

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66. The value of the infinite series $\frac{1^2+2^2}{\lfloor 3}+\frac{1^2+2^2+3^2}{\lfloor 4}+\frac{1^2+3^2+4^2}{\lfloor 5}+$ .... is

A. e

B. 5e

C. $\frac{5e}{6}-\frac{1}{2}$

D. $\frac{5e}{6}$

Answer:

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67. The value of the integral $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{(\sin x - x\cos x)}{x(x+\sin x)} dx$ is equal to

A. $\log_e\left(\frac{2(\pi+3)}{2\pi+3\sqrt{3}}\right)$

B. $\log_e\left(\frac{\pi+3}{2\left(2\pi+3\sqrt{3}\right)}\right)$

C. $\log_e\left(\frac{2\pi+3\sqrt{3}}{2(\pi+3)}\right)$

D. $\log_e\left(\frac{2\left(2\pi+3\sqrt{3}\right)}{\pi+3}\right)$

Answer:

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68. Let $f(x) = x\left(\frac{1}{x-1} + \frac{1}{x} + \frac{1}{x+1}\right), x > 1$. Then

A. $f(x) \leq 1$

B. $1 < f(x) \leq 2$

C. $2 < f(x) \leq 3$

D. $f(x) > 3$

Answer:

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69. Let $F(x) = \int_0^x \frac{\cos t}{(1+t^2)} dt, 0 \le x \le 2\pi$. Then

A. F is increasing in $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$ and decreasing in $\left(0, \frac{\pi}{2}\right)$ and $\left(\frac{3\pi}{2}, 2\pi\right)$

B. F is increasing in $(0, \pi)$ and decreasing in $(\pi, 2\pi)$

C. F is increasing $(\pi, 2\pi)$ and decreasing in $(0, \pi)$

D. F is increasing in $\left(0, \frac{\pi}{2}\right)$ and $\left(\frac{3\pi}{2}, 2\pi\right)$ and decreasing in $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$

Answer:

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70. Find the area of the region bounded by the curve $y = x^2$ and the line y = 4.

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71. Let P be a point on the parabola $y^2 = 4ax$ with focus F. Let Q denote the foot of the perpendicular from P onto the directrix. Then $\frac{\tan\angle PQF}{\tan\angle PFQ}$ is

A. 1

B. $1/2$

C. 2

D. $1/4$

Answer:

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72. An objective type test paper has 5 questions. Out of these 5 questions, 3 questions have four options each (A, B, C, D) with one option being the correct answer. The other 2 questions have two options each, namely True and False. A candidate randomly ticks the options. Then the probability that he/she will tick the correct option in at least four questions, is

A. $\frac{5}{32}$

B. $\frac{3}{128}$

C. $\frac{3}{256}$

D. $\frac{3}{64}$

Answer:

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73. A family of curves is such that the length intercepted on the y-axis between the origin and the tangent at a point is three times the ordinate of the point of contact. The family of curves is

A. xy = c, c is a constant

B. $xy^2 = c$, c is a constant

C. $x^2y = c$, c is a constant

D. $x^2y^2 = c$, c is a constant

Answer:

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74. The solution of the differential equation $(y^2 + 2x)\frac{dy}{dx} = y$ satisfies $x = 1, y = 1$. Then the solution is

A. $x = y^2(1 + \log_e y)$

B. $y = x^2(1 + \log_e x)$

C. $x = y^2(1 - \log_e y)$

D. $y = x^2(1 - \log_e x)$

Answer:

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75. The solution of the differential equation $\frac{dy}{dx}=e^{x-y}+1$ is

A. $e^{x-y}=x+c$

B. $e^{y-x}=x+c$

C. $e^{x-y}=y+c$

D. $e^{y-x}=y+c$

Answer:

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76. The area of the region enclosed between parabola $y^2=x$ and the line y = mx is $\frac{1}{48}$. Then the value of m is

A. -2

B. -1

C. 1

D. 2

Answer:

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77. Consider the system of equations :

$x + y + z = 0$

$\alpha x + \beta y + \gamma z = 0$

$\alpha^2 x + \beta^2 + \gamma^2 z = 0$

Then the system of equations has

A. a unique solution for all values of α, β, γ

B. infinite number of solutions if any two of α, β, γ are equal

C. a unique solution if α, β, γ are distinct

D. more than one, but finite number of solution depending on values of α, β, γ

Answer:

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78. The equations of the circles which touch both the axes and the line $4x + 3y = 12$ and have centres in the first quadrant, are

A. $x^2 + y^2 - x - y + 1 = 0$

B. $x^2 + y^2 - 2x - 2y + 1 = 0$

C. $x^2 + y^2 - 12x - 12y + 36 = 0$

D. $x^2 + y^2 - 6x - 6y + 36 = 0$

Answer:

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79. Which of the following real valued functions is/are not even functions ?

A. $f(x) = x^3 \sin x$

B. $f(x) = x^2 \cos x$

C. $f(x) = e^x x^3 \sin x$

D. $f(x) = x - [x]$, where [x] denote the greatest integer less than or equal to x

Answer:

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80. Let $\sin \alpha, \cos \alpha$ be the roots of the equations $x^2 - bx + c = 0$. Then which of the following statements is/are correct ?

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

B. $b \leq \sqrt{2}$

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

D. $b > \sqrt{2}$

Answer:

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