MATHS

BOOKS - BHARATI BHAWAN MATHS (HINGLISH)

Objective Tests

Exercise

1. If the sum of first n terms of an AP is cn^2, then the sum of squares of these n terms is (2009) $\frac{n(4n^2-1)c^2}{6}$ (b) $\frac{n(4n^2+1)c^2}{3}$ $\frac{n(4n^2-1)c^2}{3}$ (d) $\frac{n(4n^2+1)c^2}{6}$

A. $n(4n^2-1)\frac{c^2}{6}$

B. $n(4n^2+1)\frac{c^2}{3}$

C. $n(4n^2-1)\frac{c^2}{3}$

D. $n(4n^2+1)\frac{c^2}{6}$

Answer:

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2. The number of seven digit integers, with sum of the digits equal to 10 and formed by using the digits 1, 2 and 3 only, is

A. 55

B. 66

C. 77

D. 88

Answer:

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3. Let $z = x + iy$ be a complex number where $x and y$ are integers. Then, the area of the rectangle whose vertices are the roots of the equation $zz^3 + zz^3 = 350$ is 48 (b) 32 (c) 40 (d) 80

A. 48

B. 32

C. 40

D. 80

Answer:

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4. Let $z = \cos\theta + i\sin\theta$. Then the value of

$\sum_{m \to 1 - 15} Img\left(z^{2m-1}\right)$ at $\theta = 2^\circ$ is:

A. $\dfrac{1}{\sin 2^\circ}$

B. $\dfrac{1}{3}\sin 2^\circ$

C. $\dfrac{1}{2}\sin 2^\circ$

D. $\dfrac{1}{4}\sin 2^\circ$

Answer:

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5. The locus of the orthocentre of the triangle formed by the lines

$(1+p)x - py + p(1+p) = 0, (1+q)x - qy + q(1+q) = 0$

and y = 0, where $p \neq \cdot q$, is (A) a hyperbola (B) a parabola (C) an ellipse (D) a straight line

A. a hyperbola

B. a parabola

C. an ellipse

D. a straight line

Answer:

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6. Tangents drawn from the point $P(1, 8)$ to the circle $x^2 + y^2 - 6x - 4y - 11 = 0$ touch the circle at the points A and B. The equation of the circumcircle of the triangle PAB is

(A) $x^2 + y^2 + 4x - 6y + 19 = 0$

(B) $x^2 + y^2 - 4x - 10y + 19 = 0$

(C) $x^2 + y^2 - 2x + 6y - 29 = 0$

(D) $x^2 + y^2 - 6x - 4y + 19 = 0$

A. $x^2 + y^2 + 4x - 6y + 19 = 0$

B. $x^2 + y^2 - 4x - 10y + 19 = 0$

C. $x^2 + y^2 - 2x + 6y - 29 = 0$

D. $x^2 + y^2 - 6x - 4y + 19 = 0$

Answer:

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7. The normal at a point P on the ellipse $x^2 + 4y^2 = 16$ meets the x-axis at Q. If M is the midpoint of the line segment PQ, then the locus of M intersects the latus rectums of the given ellipse at points. $\left(\pm \frac{(3\sqrt{5})}{2} \pm \frac{2}{7} \right)$ (b)

$\left(\pm\frac{\left(3\sqrt{5}\right)}{2}\pm\frac{\sqrt{19}}{7}\right)$ $\left(\pm 2\sqrt{3},\ \pm\frac{1}{7}\right)$ (d)

$\left(\pm 2\sqrt{3}\pm\frac{4\sqrt{3}}{7}\right)$

A. $\left(\pm 3\frac{\sqrt{5}}{2},\ \pm\frac{2}{7}\right)$

B. $\left(\pm 3\frac{\sqrt{5}}{2},\ \pm\frac{\sqrt{19}}{7}\right)$

C. $\left(\pm 2\sqrt{3},\ \pm\frac{1}{7}\right)$

D. $\left(\pm 2\sqrt{3},\ \pm 4\frac{\sqrt{3}}{7}\right)$

Answer:

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8. The line passing through the extremity A of the major exis and extremity B of the minor axis of the ellipse $x^2+9y^2=9$ meets is auxiliary circle at the point $M\cdot$ Then the area of the triangle with vertices at $A, M,$ and O (the origin) is 31/10 (b) 29/10 (c) 21/10 (d) 27/10

A. $\frac{31}{10}$

B. $\frac{29}{10}$

C. $\frac{21}{10}$

D. $\frac{27}{10}$

Answer:

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9. 36. If $\vec{a}, \vec{b}, \vec{c}$ and $\vec{d}$ are unit vectors such that $\left(\vec{a} \times \vec{b}\right). \vec{c} \times \vec{d} = 1$ and $\vec{a}.\vec{c} = \frac{1}{2}$ then a) $\vec{a}, \vec{b}$ and $\vec{c}$ are non-coplanar b) $\vec{b}, \vec{c}, \vec{d}$ are non -coplanar c) $\vec{b}, \vec{d}$ are non parallel d) $\vec{a}, \vec{d}$ are parallel and $\vec{b}, \vec{c}$ are parallel

A. $\vec{a}, \vec{b}, \vec{c}$ are noncoplanar

B. $\vec{b}, \vec{c}, \vec{d}$ are noncoplanar

C. $\vec{b}, \vec{d}$ are nonparallel

D. $\vec{a}, \vec{d}$ are parallel and $\vec{b}, \vec{c}$ are parallel

Answer:

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10. A line with positive direction cosines passes through the point P(2, – 1, 2) and makes equal angles with the coordinate axes. The line meets the plane 2x + y + z = 9 at point Q. The length of the line segment PQ equals

A. 1

B. $\sqrt{2}$

C. $\sqrt{3}$

D. 2

Answer:

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11. If $P(3, 2, 6)$ is a point in space and Q be a point on the line $\vec{r} = \left(\hat{i} - \hat{j} + 2\hat{k}\right) + \mu\left(-3\hat{i} + \hat{j} + 5\hat{k}\right)$. Then the value of μ for which the vector PQ is parallel to the plane $x - 4y + 3z = 1$, is :

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

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

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

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

Answer:

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12. Let f be a non-negative function defined on the interval $[0, 1]$.

If

$$\int_0^x \sqrt{1-(f'(t))^2}dt = \int_0^x f(t)dt, 0 \le x \le 1, and f(0) = 0, then$$

$$f\left(\frac{1}{2}\right)\left\langle\frac{1}{2} and f\left(\frac{1}{3}\right)\right\rangle\frac{1}{3} \qquad f\left(\frac{1}{2}\right) > \frac{1}{2} and f\left(\frac{1}{3}\right) > \frac{1}{3}$$

$$f\left(\frac{1}{2}\right) < \frac{1}{2} and f\left(\frac{1}{3}\right) < \frac{1}{3} \; f\left(\frac{1}{2}\right) > \frac{1}{2} and f\left(\frac{1}{3}\right) < \frac{1}{3}$$

A. $f\left(\frac{1}{2}\right) < \frac{1}{2}$ and $f\left(\frac{1}{3}\right) > \frac{1}{3}$

B. $f\left(\frac{1}{2}\right) > \frac{1}{2}$ and $f\left(\frac{1}{3}\right) > \frac{1}{3}$

C. $f\left(\frac{1}{2}\right) < \frac{1}{2}$ and $f\left(\frac{1}{3}\right) < \frac{1}{3}$

D. $f\left(\frac{1}{2}\right) > \frac{1}{2}$ and $f\left(\frac{1}{3}\right) < \frac{1}{3}$

Answer:

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13. यदि $\frac{\sin^4 x}{2} + \frac{\cos^4 x}{3} = \frac{1}{5}$,तब

A. $\tan^2 x = \frac{3}{2}$

B. $\frac{\sin^8 x}{8} + \frac{\cos^8 x}{27} = \frac{1}{125}$

C. $\tan^2 x = \frac{2}{3}$

D. $\frac{\sin^8 x}{8} + \frac{\cos^8 x}{27} = \frac{2}{125}$

Answer:

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14. for $0 < \theta < \frac{\pi}{2}$ the solution(s) of $\sum_{m=1}^{6} cosec\left(\theta + \frac{(m-1)\pi}{4}\right) cosec\left(\theta + \frac{m\pi}{n}\right) = 4\sqrt{2}$ is (are):

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

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

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

D. $5\frac{\pi}{12}$

Answer:

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15. In a triangle ABC with fixed base BC, the vertex A moves such that $\cos B + \cos C = 4\sin^2 A/2$

If a, b and c denote the lengths of the sides of the triangle opposite to the angles A,B and C respectively, then

A. $b + c = 4a$

B. $b + c = 2a$

C. locus of A is an ellipse

D. locus of A is a pair of straight lines

Answer:

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16. The tangent PT and the normal PN to the parabola $y^2 = 4ax$ at a point P on it meet its axis at points T and N, respectively. The locus of the centroid of the triangle PTN is a parabola whose:

A. vertex= $\left(2\frac{a}{3}, 0\right)$

B. directrix is $x = 0$

C. latus rectum=$2\frac{a}{3}$

D. focus=$(a, 0)$

Answer:

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17. An ellipse intersects the hyperbola $2x^2 - 2y^2 = 1$ orthogonally. The eccentricity of the ellipse is reciprocal of that of the hyperbola. If the axes of the ellipse are along the coordinate axes, then

A. equation of the ellipse is $x^2 + 2y^2 = 2$

B. foci of the ellipse are $(\pm 1, 0)$

C. equation of the ellipse is $x^2 + 2y^2 = 4$

D. foci of the ellipse are $(\pm \sqrt{2}, 0)$

Answer:

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18. Let L = $\lim_{x \to 0} \frac{a - \sqrt{a^2 - x^2} - \frac{x^2}{4}}{x^4}$, a>0.If L is finite, then

A. $a = 2$

B. $a = 1$

C. $L = \frac{1}{64}$

D. $L = \frac{1}{32}$

Answer:

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19. For the function $f(x) = x \cos \frac{1}{x}, x \geq 1$

A. for the least one$x \in [1, \infty), f(x + 2) - f(x) < 2$

B. $\lim_{x \to \infty} f'(x) = 1$

C. for all $x \in [1, \infty), f(x+2) - f(x).2$

D. $f'(x)$ is strictlydecreasing in [1,oo]`.

Answer:

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20. If $I_n = \int_{-\pi}^{\pi} \frac{\sin nx}{(1+\pi^x)\sin x} dx, n = 0, 1, 2, \ldots\ldots$ then which one of the following is not true ?

A. $I_n = I_n + 2$

B. $\sum_{m=1}^{10} I_{2m+1} = 10\pi$

C. $\sum_{m=1}^{10} I_{2m} = 0$

D. $I_n = I_n + 1$

Answer:

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21. The area of the region bounded by the curve $y = e^x$ and lines x=0 and y=e is

A. $e - 1$

B. $\int_1^e \log_e(e + 1 - y)dy$

C. $e - \int_0^1 e^x dx$

D. $\int_1^e \log_e y dy$

Answer:

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22. Q. Let p and q real number such that $p \neq 0$,$p^2 \neq q$ and $p^2 \neq -q$. if α and β are non-zero complex number satisfying

$\alpha+\beta=-p$ and $\alpha^3+\beta^3=q$, then a quadratic equation having $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$ as its roots is

A. (P^3 +q) x^2 - (P^3 + 2q) x+ (p^3 +q)=0`

B. (P^3 +q) x^2 - (P^3 - 2q) x+ (p^3 +q)=0`

C. (P^3 -q) x^2 - (5P^3 - 2q) x+ (p^3 -q)=0`

D. (P^3 -q) x^2 - (5P^3 + 2q) x+ (p^3 -q)=0`

Answer:

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23. Let $S=\{1, , 2, 34\}$. The total number of unordered pairs of disjoint subsets of S is equal a.25 b. 34 c. 42 d. 41

A. 25

B. 34

C. 42

D. 41

Answer:

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24. For $r = 0, 1, \ldots . . , 10$, let $A_r, B_r,$ and $C_r$denote, respectively, the coefficient of x^r in the expansions of $(1+x)^{10}, (+x)^{20}$ and $(1+x)^{30}$.Then $\sum_{r=1}^{10} A_r(B_{10}B_r - C_{10}A_r)$ is equal to

A. $B_{10} - C_{10}$

B. $a_{10}\left(B_{10}^2 - C_{10}A_{10}\right)$

C. 0

D. $C_{10} - B_{10}$

Answer:

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25. The number of 3×3 matrices A whose entries are either 0 or 1 and for which the system $A[xyz] = [100]$ has exactly two distinct solution is a. 0 b. $2^9 - 1$ c. 168 d. 2

A. 0

B. $2^9 - 1$

C. 168

D. 2

Answer:

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26. If the angle A , B and C of a triangle are in arithmetic progession and if a , b and c denote the lengths of the sides to A , B and C respectively , then the value of the expression $\frac{a}{b}$ sin 2C + $\frac{c}{a}$sin 2A is

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

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

C. 1

D. $\sqrt{3}$

Answer:

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27. Two adjacent sides of a parallelogram $ABCD$ are given by $\overrightarrow{A}B = 2\hat{i} + 10\hat{j} + 11\hat{k} and \overrightarrow{A}D = -\hat{i} + 2\hat{j} + 2\hat{k}$. The side

AD is rotated by an acute angle α in the plane of the parallelogram so that AD becomes AD'. If AD' makes a right angle with the side AB, then the cosine of the angel α is given by $\frac{8}{9}$ b. $\frac{\sqrt{17}}{9}$ c. $\frac{1}{9}$ d. $\frac{4\sqrt{5}}{9}$

A. $\frac{8}{9}$

B. $\frac{\sqrt{17}}{9}$

C. $\frac{1}{9}$

D. $4\frac{\sqrt{5}}{9}$

Answer:

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28. The equation of the plane containing the straight line $\frac{x}{2}=\frac{y}{3}=\frac{z}{4}$ and perpendicular to the plane containing the straight lines $\frac{x}{3}=\frac{y}{4}=\frac{z}{2}$ and $\frac{x}{4}=\frac{y}{2}=\frac{z}{3}$ is :

A. $x+2y-2z=0$

B. $3x+2y-2z=0$

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

D. $5x+2y-4z=0$

Answer:

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29. If the distance of the point $P(1,-2,1)$ from the plane $x+2y-2z=\alpha, where\alpha>0, is5,$ then the foot of the perpendicular from P to the place is a. $\left(\frac{8}{3},\frac{4}{3},-\frac{7}{3}\right)$ b. $\left(\frac{4}{3},-\frac{4}{3},\frac{1}{3}\right)$ c. $\left(\frac{1}{3},\frac{2}{3},\frac{10}{3}\right)$ d. $\left(\frac{2}{3},-\frac{1}{3},-\frac{5}{3}\right)$

A. $\left(\frac{8}{3},\frac{4}{3},-\frac{7}{3}\right)$

B. $\left(\frac{4}{3}, \frac{4}{3}, \frac{1}{3}\right)$

C. $\left(\frac{1}{3}, \frac{2}{3}, \frac{10}{3}\right)$

D. $\left(\frac{2}{3}, -\frac{1}{3}, \frac{5}{2}\right)$

Answer:

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30. Let f, g and h be real-valued functions defined on the interval $[0, 1]$ by $f(x) = e^{x^2} + e^{-x^2}$, $g(x) = xe^{x^2} + e^{-x^2}$ and $h(x) = x^2 e^{x^2} + e^{-x^2}$. if a, b and c denote respectively, the absolute maximum of f, g and h on $[0, 1]$ then

A. $a = b$ and b!+c`

B. $c = a$ and a!+b`

C. $a \neq b$ and $b! + c$

D. $a = b = c$

Answer:

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31. Let f be a real-valued function defined on the inverval $(-1, 1)$ such that $e^{-x} f(x) = 2 + \int_0^x \sqrt{t^4 + 1} dt,$ for all, $x \in (-1, 1) and let f^{-1}$ be the inverse function of f. Then $(f^{-1})'(2)$ is equal to 1 (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{1}{e}$

A. 1

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

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

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

Answer:

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32. Let ω be a complex cube root unity with $\omega \neq 1$. A fair die is thrown three times. If $r_1, r_2 and r_3$ are the numbers obtained on the die, then the probability that $\omega^{r1} + \omega^{r2} + \omega^{r3} = 0$ is $1/18$ b. $1/9$ c. $2/9$ d. $1/36$

A. $\frac{1}{18}$

B. $\frac{1}{9}$

C. $\frac{2}{9}$

D. $\frac{1}{36}$

Answer:

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33. A signal which can be green or red with probability $\frac{4}{5}$ and $\frac{1}{5}$ respectively, is received by station A and then and 3 transmitted to station B. The probability of each station receiving the signal correctly is $\frac{3}{4}$ If the signal received at station B is green, then the probability that the original signal was green is (a) $\frac{3}{5}$ (b) $\frac{6}{7}$ (d) $\frac{20}{23}$ (d) $\frac{9}{20}$

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

B. $\frac{6}{7}$

C. $\frac{20}{23}$

D. $\frac{9}{20}$

Answer:

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34. Let z_1 and z_2 be two distinct complex numbers and $z = (1-t)z_1 + iz_2$, for some real number t with $0 < t < 1$ and $i = \sqrt{-1}$. If arg(w) denotes the principal argument of a non-zero compolex number w, then

A. $|z - z_1| + |z - z_2| = |z_1 - z_2|$

B. `arg|z-z_1| =arg |z-z_2|

C.

$$\begin{vmatrix} z - z_1 & \bar{z} - \bar{z}_1 \\ z_2 - z_1 & \bar{z}_2 - \bar{z}_1 \end{vmatrix} = 0$$

D. `arg|z-z_1| =arg |z_2-z_1|

Answer:

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35. Let ABC be a triangle such that $\angle ACB = \frac{\pi}{6}$ and let a , b and c denote the lengths of the side opposite to A ,B and C respectively. The value of x for which $a = x^2 + x + 1, b = x^2 - 1$ and $c = 2x + 1$ is

A. $-(2 + \sqrt{3})$

B. $\sqrt{3} + 1$

C. $2 + \sqrt{3}$

D. $4\sqrt{3}$

Answer:

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36. Let A and B be two distinct points on the parabola $y^2 = 4x$. If the axis of the parabola touches a circle of radius r having

AB as its diameter, then the slope of the line joining A and B can be (A) $-\frac{1}{r}$ (B) $\frac{1}{r}$ (C) $\frac{2}{r}$ (D) $-\frac{2}{r}$

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

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

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

D. $-\frac{2}{r}$

Answer:

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