MATHS

BOOKS - BHARATI BHAWAN MATHS (HINGLISH)

Integrated Tests

Exercise

1. Fill in the blanks in each of the following so that the resulting statement becomes true. The number of terms in the expansion of $(3a + 2b + c)^{12}$ is ____

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2. Fill in the blanks in each of the following so that the resulting statement becomes true. The value of $\int \frac{dx}{\sqrt{1-\sqrt{x}}}$ = _____.

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3. Fill in the blanks in each of the following so that the resulting statement becomes true. Let $\vec{r} = l\left(\vec{b} \times \vec{c}\right) + m\left(\vec{c} \times \vec{a}\right) + n\left(\vec{a} \times \vec{b}\right)$ and $\left[\vec{a}\,\vec{b}\,\vec{c}\right] = 3$. Then $l + m + n =$ _____ in terms of $\vec{r}$, $\vec{a}$, $\vec{b}$ and $\vec{c}$.

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4. If a normal to a parabola $y^2 = 4ax$ makes an angle ϕ with its axis, then it will cut the curve again at an angle

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

B. $\tan^{-1}(2\tan\psi)$

C. $\tan^{-1}\left(\frac{1}{2}\tan\psi\right)$

D. none of these

Answer:

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5. Let C be any circle with centre $(0, \sqrt{2})$. Prove that at most two rational points can be there on C.

(A rational point is a point both of whose coordinates are rational numbers .)

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6. A discontinuous function $y = f(x)$ satisfying $x^2 + y^2 = 4$ is given by $f(x) = \ldots.$

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7. An ellipse has OB as a semi-minor axis, F and F' are its two foci and the angle FBF' is a right angle. Find the eccentricity of the ellipse.

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8. A die is thrown three times and the sum of the 3 numbers shown is 15. The probability that the first throw was a four, is

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9. Fill in the blanks ine ach of the following so that that resulting sentence becomes true. If $\sin\theta = \frac{2}{3}, \frac{5\pi}{2} < \theta < 3\pi$ then $\sin\left(\frac{\theta}{2}\right)$= _____.

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10. The equation $xe^x = 2$ has

A. one

B. two

C. zero

D. indifinite

Answer:

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11. A function $f(x) = x\left[1 + \left(\frac{1}{3}\right)\sin\left(Inx^2\right)\right], x \neq 0.$ integral part $f(0) = 0.$ Then the function

A. continous and monotonic increasing everywhere

B. continous and differentiable everywhere

C. nondifferentiable and monotonic everywhere

D. differentiable and monotonic everywhere

Answer:

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12. Prove that $\sum_{k=1}^{n-1}(n-k)\frac{\cos(2k\pi)}{n} = -\frac{n}{2}, wheren \geq 3isan \in te \geq r$

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13. ABC is an isosceles triangle inscribed in a circle of radius r , if AB = AC and h is the altitude from A to BC . If the $\triangle ABC$ has perimeter P and $\triangle$ then $\lim_{h \to 0} 512r\frac{\Delta}{p^3}$ equals

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14. Let z_1 and z_2 be the root of the equation $z^2 + pz + q = 0$ where the coefficient p and q may be complex numbers. Let A and B represent z_1 and z_2 in the complex plane. If $\angle AOB = \alpha \neq 0$ and 0 and $OA = OB, whereO$ is the origin prove that $p^2 = 4q\cos^2\left(\frac{\alpha}{2}\right)$

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15. Let $f(x) = \begin{cases} \{1 + |\sin x|\}^{a/|\sin x|}, & \frac{\pi}{6} < x < 0 \\ \text{b}, & x = 0 \\ e^{\tan 2x / \tan 3x}, & 0 < x < \frac{\pi}{6} \end{cases}$

Determine a and b such that f(x) is continous at x = 0.

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16. Determine the constant c such that the straight line joining the points (0,3) and $(5-2)$ is a tangent to the curve $y=\frac{c}{x+1}$.

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17. Two vertices of an equilateral triangle are $(-1,0)$ and (1, 0), and its third vertex lies above the x-axis. The equation of its circumcircel is _____

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18. If $x^2+px=q$ is an integer for every integral value of x then which is necessarily true? (A) $p\varepsilon I, q\not\varepsilon I$ (B) $p\not\varepsilon I, q\varepsilon I$ (C) $p\varepsilon I, q\varepsilon I$ (D) $p\not\varepsilon, q\not\varepsilon I$

A. p is a fraction and q is an integer

B. p and q both must be integers

C. p and q both are fractions

D. none of these

Answer:

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19. If θ is the angle between the unit vectors $\hat{a}$ and $\hat{b}$ then $\cos\left(\frac{\theta}{2}\right)$ is equal to

A. 0

B. 1

C. -1

D. none of these

Answer:

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20. A bag A contains 2 white and 3 red balls and a bag B contains 4 white and 5 red and balls. One ball is drawn at random from one of the bags and is found to be red. Find the probability that it was drawn from bag B.

A. $\frac{5}{14}$

B. $\frac{5}{16}$

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

D. $\frac{25}{52}$

Answer:

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21. If $\left(1+x+x^2+x^3\right)^n = a_0 + a_1 x + a_2 x^2 + a_3 x^3 + \ldots + a_{3n} x^{3n}$, then the value of $a_0 + a_4 + a_8 + a_{12} + \ldots\ldots$ is

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22. If the parabolas $y^2 = 4ax$ and $y^2 = 4c(x-b)$ have a common normal other than the x-axis $(a, b, c$ being distinct positive real numbers), then prove that $\frac{b}{a-c} > 2$.

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23. A curve $y = f(x)$ passes through the point $P(1, 1)$. The normal to the curve at P is $a(y - 1) + (x - 1) = 0$. If the slope of the tangent at any point on the curve is proportional to the ordinate of the point. Determine the equation of the curve. Also obtain the area bounded by the y-axis, the curve and the normal to the curve at P.

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