MATHS

BOOKS - DISHA PUBLICATION MATHS (HINGLISH)

CHAPTERWISE NUMERIC INTEGER ANSWER QUESTIONS

Chapter 1

1. 25 people for programme A, 50 people for programme B, 10 people for both. So, number of employee employed only A is

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2. In a survey of 500 TV viewer, it was found that 285 watch cricket, 195 watch foodball and 115 watch tennis. Also, 45 watch both cricket and football, 70 watch both cricket and tennis, and 50 watch football and tennis, If 50 do not watch any game on TV. then the number of viewes watch all the games is

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3. Given n(U) = 20, n(A) = 12, n(B) = 9, $n(A \cap B)$ = 4, where U is the universal set, A and B are subsets of U, then $n((A \cup B)')$ equals

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4. In a statistical investigation of 1003 families of Calcutta, it was found that 63 families has neither a radio nor a T.V, 794 families has a radio and 187 has T.V. The number of families in the group having both a radio and a T.V is

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5. Let $S = \{1, 2, 3, \ldots, 100\}$. The number of non-empty subsets A to S such that the product of elements in A is even is

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6. A dinner party is to be fixed for a party consisting of 100 pe party 50 do not prefer fish, 60 prefer chicken and 10 do not ersons. Inth and 10 do not prefer eite chicken or fish. The number of persons who prefer both fish and chicken (a) 10 (b)20 (c) 30 (d) 40

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7. Let Z be the set of integers. If A = $\{x \in Z : 2(x+2)\left(x^2 - 5x + 6\right)\} = 1$ and $B = \{x \in Z : -3 < 2x - 1 < 9\}$, then the number of subsets of the set A $\times$ B, is

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8. Let $n(U) = 700$, $n(A) = 200$,$n(B) = 300$ and $n(A \cap B) = 100$, then find $n(A' \cap B')$

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9. Out of 800 boys in a school, 224 played cricket, 240 played hockey and 336 played basketball. Of the total, 64 played both basketball and hockey; 80 played cricket and basketball and 40 played cricket and hockey; 24 played all the three games. The number of boys who did not play any game is

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10. The number of elements in the set $\{(a, b) : 2a^2 + 3b^2 = 35.\ a.\ b \in Z\}$,where Z is the set of all integers, is

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11. In a class of 55 students, the number of students studying different subjects are 23 in Mathematics, 24 in Physics, 19 in Chemistry, 12 in Mathematics and Physics, 9 in Mathematics and Chemistry, 7 in Physics and Chemistry and 4 in all the three subjects. Find the number of students who have taken exactly one subject.

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12. 20 teachers of a school either teach mathematics or physics 12 of them mathematics white 4 teach both the subjects . The number of teachers teching physics only ,is

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13. There are 100 students in a class. In the examination, 50 of them failed in Mathematics, 45 failed in Physics, 40 failed in Biology and 32 failed in exactly two of the three subjects. Only one student passed in all the subjects. Then, the number of students failing in all the three subjects is

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14. In a class of 100 students, 55 students have passed in Mathematics and 67 students have passed in Physics. Then the number of students who have passed in Physics only is

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15. In a battle, 70% of the combatants lost one eye, 80% an are, 75% an arem. 85% a leg, and $x\%$ lost all the four organs. Then minimum value of x is

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Chapter 2

1. If $a = \{2, 4, 5\}, B = \{7, 8, 9\}$ then find $n(A \times B)$.

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2. If the domain of the function

$f(x) = \left[\log_{10}\left(\frac{5x - x^2}{4}\right)\right]^{1/2}$ is $a \le x \le b$, then a,b is

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3. If $e^{f(x)} = \frac{10 + x}{10 - x}, x \in (-10, 10)$ and $f(x) = k. f\left(\frac{200x}{100 + x^2}\right)$

then k=

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4. If $A = \{1, 2, 3\}, B = \{4, 5, 6\}$ and $C = \{1, 2\}$, then:

$(A - B) \times (A \cap C) =$

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5. Sum of the number of elements in the domain and range of the relation R given by $E = \left\{(x, y) : y = x + \frac{6}{x},\right.$ where $x, y \in N$ and $x < 6\}$ is

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6. Let R be a relation on N defined by $x + 2y = 8$. The domain of R is

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7. The function f satisfies the functional equation $3f(x) + 2f\left(\frac{x + 59}{x1}\right) = 10x + 30$ for all real $x \neq 1$. The value of $f(7) is$ 8 (b) 4 (c) -8 (d) 11

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8. If A is the set of even natural number less than 8 and B is the set of prime numbers less then 7, then the number of relations from A to B is 2^9

(b) 9^2 (c) 3^2 (d) $2^9 - 1$

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9. If $2f(x+1) + f\left(\frac{1}{x+1}\right) = 2x,$ then $f(2)$ is equal to

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10. If $R = \{(x, y) : x, y \in Z,\ x^2 + y^2 \leq 4\}$ is a relation defined on the set Z of integers, then write domain of R.

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11. If $n(A) = 4, n(B) = 3, n(A \times B \times C) = 24$, then n(C) equals

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12. The values of $bandc$ for which the identity of $f(x+1) - f(x) = 8x + 3$ is satisfied, where $f(x) = bx^2 + cx + d, are$ $b = 2, c = 1$ (b) $b = 4, c = -1$ $b = -1, c = 4$ (d) $b = -1, c = 1$

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13. If $f(x) = ax^2 + bx + c$ and $g(x) + px^2 + qx$ with $g(1) = f(1)$ $g(2) - f(2) = 1$ $g(3) - f(3) = 4$ then $g(4) - f(4)$ is

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14. For a real number x, $[x]$ denotes greatest integer function, then find value of $\left[\frac{1}{2}\right] + \left[\frac{1}{2} + \frac{1}{100}\right] + \left[\frac{1}{2} + \frac{2}{100}\right] + \ldots + \left[\frac{1}{2} + \frac{99}{100}\right]$

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15. Range of the function $f(x) = \dfrac{x+2}{|x+2|}$ is

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Chapter 3

1. For any $\theta \varepsilon \left(\dfrac{\pi}{4}, \dfrac{\pi}{2}\right)$ the expression $3(\sin\theta - \cos\theta)^4 + 6(\sin\theta + \cos\theta)^2 + 4\sin^6\theta$ equals:

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2. If $0 \leq x \leq \dfrac{\pi}{2}$, then the number of value of x for which $\sin x - \sin 2x + \sin 3x = 0$, is

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3. The value of $\dfrac{\cos\pi}{2^2} \cdot \dfrac{\cos\pi}{2^3} \cdots\cdots\cdots \dfrac{\cos\pi}{2^{10}} \cdot \dfrac{\sin\pi}{2^{10}}$ is

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4. The maximum values of $3\cos\theta + 5\sin\left(\theta - \frac{\pi}{6}\right)$ for any real value of θ is:

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5. यदि $\sin^4\alpha + 4\cos^4\beta + 2 = 4\sqrt{2}\sin\alpha\cos\beta : \alpha, \beta \in [0, \pi]$ तो $\cos(\alpha + \beta) - \cos(\alpha - \beta)$ बराबर है

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6. The value of $\cos^2 10^\circ - \cos 10^\circ \cos 50^\circ + \cos^2 50^\circ$ is

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7. The number of solutions of the equation $1 + \sin^4 x = \cos^2 3x, x \in \left[-\frac{5\pi}{2}, \frac{5\pi}{2}\right]$ is

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8. Let α, β be such that $\pi < \alpha - \beta < 3\pi$.

If $\sin\alpha + \sin\beta = -\frac{21}{65}$ and $\cos\alpha + \cos\beta = -\frac{27}{65}$ and if the value of $\cos\frac{\alpha - \beta}{2} = \frac{-a}{\sqrt{b}}$, then $a \times b =$

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9. A triangular park is enclosed on two sides by a fence and on the third side by a straight river bank. The two sides having fence are of same length x. The maximum area enclosed by the park is

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10. If p and q are positive real numbers such that $p^2 + q^2 = 1$ then find the maximum value of $(p + q)$

A.

B.

C.

D.

Answer: 2

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11. Find the number of solution of $\tan x + \sec x = 2\cos x$ in $[0, 2\pi]$

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12. Number of values of x in the interval $[0, 3\pi]$ satisfying the equation $2\sin^2 x + 5\sin x - 3 = 0$ is

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13. In triangle ABC given $9a^2 + 9b^2 - 17c^2 = 0$. If $\frac{\cot A + \cot B}{\cot C} = \frac{m}{n}$, then the value of $(m + n)$ equals

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14. An observer on the top of a tree ,finds the angle of depression of a car moving towards the tree to be 30° .After 3 minutes this angle becomes 60°.After how much more time , the car will reach the tree ?

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Chapter 4

1. $11^{n+2} + 12^{2n+1}$ is divisible by 133.

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2. If n is a positive integer, then $2.4^{2n+1}+3^{3n+1}$ is divisible by :

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3. When 2^{301} is divided by 5, the least positive remainder is

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4. 41^n-14^n is a multiple of 27

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5. Prove by using the principle of mathematical induction that for all $n \in N$, $10^n+3.4^{n+2}+5$ is divisible by 9

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6. For every natural number n, $n(n^2 - 1)$ is divisible by

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7. Prove that $2.\ 7^n + 3.\ 5^n - 5$is divisible by 24, for all $n \in N$.

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8. $7^{2n} + 2^{3n-3}.3^{n-1}$ is divisible by 25

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9. Let $P(n) : 2^n < (1 \times 2 \times 3 \times \quad \times n)$. Then the smallest positive integer for which $P\ (n)$ is true is 1 b. 2 c. 3 d. 4

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10. If m and n are any two odd positive integers with $n < m$, then the largest positive integer which divides all numbers of the form $(m^2 - n^2)$, is

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11. For every natural number n, $3^{2n+2} - 8n - 9$ is divisible by 8

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12. Find the remainder when 5^{99} is divided by 13.

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13. For all positive intergral values of n, $3^{2n} - 2n + 1$ is divisible by

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14. For all $n \in N$, $3.5^{2n+1} + 2^{3n+1}$ is divisble by-

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15. The remainder when 5^{4n} is divided by 13, is

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Chapter 5

1. Let α and β be two roots of the equation $x^2 + 2x + 2 = 0$. Then $\alpha^{15} + \beta^{15}$ is equal to

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2. Let Z_0 is the root of equation $x^2 + x + 1 = 0$ and $Z = 3 + 6i(Z_0)^{81} - 3i(Z_0)^{93}$ Then arg (Z) is equal to (a) $\frac{\pi}{4}$ (b) $\frac{\pi}{3}$ (c) π

(d) $\frac{\pi}{6}$

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3. If $z = \left(\frac{\sqrt{3}}{2} + \frac{i}{2}\right)^5 + \left(\frac{\sqrt{3}}{2} - \frac{i}{2}\right)^5$, then

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4. Let z be a complex number such that |z|+z=3+I

(Where $i = \sqrt{-1}$)

Then ,|z| is equal to

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5. Let $\frac{z-\alpha}{z+\alpha}$ is purely imaginary and $|z| = 2, \alpha \varepsilon R$ then α is equal to (A) 2 (B) 1 (C) $\sqrt{2}$ (D) $\sqrt{3}$

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6. Let z_1 and z_2 be two complex numberjs satisfying $|z_1| = 3$ and $|z_2 - 3 - 4i| = 4$. Then the minimum value of $|z_1 - z_2|$ is

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7. If α and β be the roots of the equation $x^2 - 2x + 2 = 0$, then the least value of n for which $\left(\frac{\alpha}{\beta}\right)^n = 1$ is:

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8. All the points in the set $S = \left\{\frac{\alpha + i}{\alpha - i} : \alpha \in R\right\}\left(i = \sqrt{-1}\right) lie$ on a

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9. If m is chosen in the quadratic equation $(m^2 + 1)x^2 - 3x + (m^2 + 1)^2 = 0$ such that the sum of its roots is greatest, then the absolute difference of the cubes of its roots is

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10. If $z = x - iy$ and $z'^{\frac{1}{3}} = p + iq,$ then $\dfrac{\left(\frac{x}{p} + \frac{y}{q}\right)}{p^2 + q^2}$ is equal to

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11. Let Z and w be two complex number such that $|zw| = 1$ and $arg(z) = \pi/2$ then

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12. If $|z + 4| \leq 3$ then the maximum value of $|z + 1|$ is

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13. For the equation $3x^2 + px + 3 = 0, p > 0,$ if one of the root is square of the other, then p is equal to $\frac{1}{3}$ (b) 1 (c) 3 (d) $\frac{2}{3}$

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14. If one of the factors of $ax^2 + bx + c$ and $bx^2 + cx + a$ is common then

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15. If $x^2 - hx - 21 = 0, x^2 - 3hx + 35 = 0 (h > 0)$ has a common root, then the value of h is equal to

A. 2

B. 4

C. 6

D. 8

Answer: 4

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Chapter 6

1. Numberof integral solution of $2x - 1 = |x + 7|$ is

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2. Find al pairs of consecutive odd natural number, both of which are larger than 10, such that their sum is less than 40.

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3. Number of intergeral solution satisfying

$x + \sqrt{3 - x} \geq \sqrt{3 - x} + 3$ is

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4. If $\left(\sqrt{2}\right)^{x} + \left(\sqrt{3}\right)^{x} = \left(\sqrt{13}\right)^{x/2}$, then the number of real values of x is

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5. If $x \equiv 2 +^{2/3}$ then the value$\left(x^3 - 6x^2 + 6x\right) is$

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6. The solution of the equation $(\log)_7(\log)_5\left(\sqrt{x+5} + \sqrt{x} = 0\right.$ is...

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7. Let $\{x\}$ and $[x]$ denote the fractional and integral part of x, respectively. So $4\{x\} = x + [x]$.

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8. Solve for $x: 4^x - 3^{x-\frac{1}{2}} = 3^{x+\frac{1}{2}} - 2^{2x-1}$

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9. solve $\frac{|x+3|+x}{x+2} > 1$

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10. The longest side of a triangle is 4 times the shortest side and the third side is 3 cm shorter than the longest side. If the perimeter of a triangle is at least 87 cm, then the minimum length of the shortest side is

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11. Ravi obtained 70 and 75 marks in first two unit test. Find the number if minimum marks he should get in the third test to have an average of at least 60 marks.

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12. The total number of integral value of x satisfying the equation $x^{\log_3 x^2} - 10 = 1/x^2$ is

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13. The number of integers satisfying the equation $|x| + \left|\frac{4 - x^2}{x}\right| = \left|\frac{4}{x}\right|$ is

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14. If $a, b,$ and c are distinct positive real numbers and $a^2 + b^2 + c^2 = 1$, then $ab + bc + ca$ is

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15. The solution of $\left|x + \frac{1}{x}\right| > 2$ is

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Chapter 7

1. The number of natural numbers less than 7,000 which can be formed by using the digits 0, 1, 3, 7, 9 (repetition of digits allowed) is equal to

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2. The number of functions f from $\{1, 2, 3, \ldots, 20\}$ onto $\{1, 2, 3, \ldots\ldots..20\}$ such that f (k) is a multiple of 3 whenever k is a multiple of 4 is:

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3. Consider three boxes, each containing 10 balls labelled 1, 2, ..., 10. Suppose one ball is randomly drawn from each of the boxes denoted by n_i, the label of the ball drawn from the i^{th} box, (I = 1, 2, 3). Then, the number of ways in which the balls can be chosen such that $n_1 < n_2 < n_3$ is

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4. There are m men and two women participating in a chess tournament. Each participant plays two games with every other participant. If the number of games played by the men between themselves exceeds the number of games played between the men and the women by 84, then teh value of m is

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5. In a circus there are ten cages for accommodating ten animals Out of these four cages are so small that five out of 10 animals cannot enter into them. In how many ways will it is possible to accommodate ten animals in these cages

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6. How many numbers greater than 1000, but not greater than 4000 can be formed with the digits 0, 1, 2, 3, 4 if: (i) repetition of digits is allowed? (ii) repetition of digits is not allowed?

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7. The number of n digit numbers which consists of the digit 1 and 2 only if each digit is to be used at least nece is equal to 510, then n is equal to _______.

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8. Four buses run between Bhopal and Gwalior. If a man goes from Gwalior to Bhopal by a bus and comes back to Gwalior by another bus, find the total possible ways.

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9. How many numbers lying between 500 and 600 can be formed with the help of the digits 1, 2, 3, 4, 5, 6 when the digits are not to be repeated

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10. The sum of integers from 1 to 100 that are divisible by 2 or 5 is

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11. If the letters of the word SACHIN are arranged in all possible ways and these words are written out as in dictionary, then the word SACHIN appears at serial number 602 (2) 603 (3) 600 (4) 601

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12. The range of the function $f(x) = 7 - xp_{x-3}$, is

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13. Five digit number divisible by 3 is formed using 0 1 2 3 4 6 and 7 without repetition Total number of such numbers are

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14. The number of ways in which 6 men and 5 women can dine at a round table if no two women are to sit together is given by

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15. All possible numbers are formed using the digits $1, 1, 2, 2, 2, 2, 3, 4, 4$ taken all at a time. The number of such numbers in which the odd digits occupy even places is:

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Chapter 8

1. The coefficient of t^4 in the expansion of $\left(\frac{1-t^6}{1-t}\right)^3$ is 3k. The value of k is ________.

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2. Let $(x+10)^{50}+(x-10)^{50}=a_0+a_1x+a_2X^2+\ldots..+a_{50}x^{50}$, for all $x\in R$, then $\frac{a_2}{a_0}$ is equal to

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3. The sum of the coefficients of all even degree terms is x in the expansion of : $\left(x+\sqrt{x^3-1}\right)^6+\left(x-\sqrt{x^3-1}\right)^6, (x>1)$ is equal to

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4. If the fourth term in the binomial expansion of $\left(\sqrt{\frac{1}{x^{1+\log_{10} x}}}+x^{\frac{1}{12}}\right)^6$ is equal to 200 , and $x > 1$, then the value of x is :

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5. The expression

$\left[x+\left(x^3-1\right)^{\frac{1}{2}}\right]^5+\left[x-\left(x^3-1\right)^{\frac{1}{2}}\right]^5$ is a polynomial of degree

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6. Find the remainder when 27^{40} is divided by 12.

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7. If r^{th} and $(r+1)^{th}$ term in the expansion of $(p+q)^n$ are equal, then $\frac{(n+1)q}{r(p+q)}$ is

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8. If the ratio of the coefficient of third and fourth term in the expansion of $\left(x - \frac{1}{2x}\right)^n$ is $1:2,$ then the value of n will be

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9. The coefficient of $x^5 \in \left(1 + 2x + 3x^2 + \right)^{-3/2} is(|x| < 1)$ 21 b. 25 c. 26 d. none of these

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10. If the sum of the coefficients in the expansion of $(a+b)^n$ is 4096, then the greatest coefficient in the expansion is 924 b. 792 c. 1594 d. none of these

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11. For natural numbers

$m, n,$ if $(1-y)^m(1+y)^n = 1 + a_1 y + a_2 y^2 + , and a_1 = a_2 = 10, then$

`m nc. m+n=80$d$. m-n=20`

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12. The coefficient of the middle term in the binomial expansion in powers of x of$(1+\alpha x)^4$ and of$(1-\alpha x)^6$ is the same, if α equals $-\frac{5}{3}$ b. $\frac{10}{3}$ c. $-\frac{3}{10}$ d. $\frac{3}{5}$

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13. If the coefficient of $x^7 \in \left[ax^2 - \left(\frac{1}{bx^2}\right)\right]^{11}$ equal the coefficient of x^{-7} in satisfy the $\left[ax - \left(\frac{1}{bx^2}\right)\right]^{11}, then a and b$ satisfy the relation $a+b=1$ b. $a-b=1$ c. $b=1$ d. $\frac{a}{b}=1$

A. $ab = -1$

B. $a = b$

C. $a.\,b = 1$

D. $a + b = 0$

Answer: 1

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14. The number of integral terms in the expansion of $\left(\sqrt{3} + \sqrt[8]{5}\right)^{256}$ is

A. 33

B. 34

C. 35

D. 32

Answer: 33

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15. $\left(\sqrt[6]{3}\sqrt{2}+\frac{1}{\sqrt[3]{3}}\right)^n, \frac{t_7 \text{fron the } 1^{st}}{t_7 \text{from the last}}=\frac{1}{6},$ then the value of n is

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Chapter 9

1. Let $a_1, a_2, \ldots, a_{30}$ be an AP, $S=\sum_{i=1}^{30} a_i$ and $T=\sum_{i=1}^{15} a_{2i-1}$ If $a_5=27$ and $S-2T=75$ then a_{10} is equal to (a) 57 (b) 42 (c) 52 (4) 47

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2. The sum of series

$$1+6+\frac{9\left(1^2+2^2+3^2\right)}{7}+\frac{12\left(1^2+2^2+3^2+4^2\right)}{9}+\frac{15\left(1^2+2^2+\ldots+5\right.}{11}$$

up to 15 terms is

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3. Let $S_n = 1 + q + q^2 + ? + q^n$ and $T_n = 1 + \left(\frac{q+1}{2}\right) + \left(\frac{q+1}{2}\right)^2 + ? + \left(\frac{q+1}{2}\right)^n$ If $\alpha T_{100} = ^{101}C_1 + ^{101}C_2 x S_1 + ^{101}C_{101} x S_{100}$, then the value of α is equal to (A) 2^{99} (B) 2^{101} (C) 2^{100} (D) -2^{100}

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4. If $a_1, a_2, a_3,$ be terms of an A.P. if $\frac{a_1 + a_2 + \; + a_p}{a_1 + a_2 + \; + a_q} = \frac{p^2}{q^2}, p \neq q, then \frac{a_6}{a_{21}}$ equals 41/11 b. 7/2 c. 2/7 d. 11/41

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5. If the fifth term of a G.P. is 2, then write the product of its 9 terms.

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6. The value of $\sum_{k=1}^{10}\left(\frac{\sin(2\pi k)}{11} - i\frac{\cos(2\pi k)}{11}\right)$ is

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7. The value of $2^{\frac{1}{4}}.4^{\frac{1}{8}}.8^{\frac{1}{16}},,,,,,,\infty$ is equal to.

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8. The sum $\sum_{k=1}^{20} k\frac{1}{2^k}$ is equal to

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9. If the sum and product of the first three terms in an AP are 33 and 1155, respectively, then a value of its 11th term is

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10. Let numbers $a_1, a_2 \ldots a_{16}$ are in AP and $a_1 + a_4 + a_7 + a_{10} + a_{13} + a_{16} = 114$ then $a_1 + a_5 + a_{12} + a_{16}$ is equal to

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11. The first three of four given numbers are in G.P. and their last three are in A.P. with common difference 6. If first and fourth numbers are equal, then the first number is 2 b. 4 c. 6 d. 8

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12. If the geometric mean of a and b is $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ then n = ?

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13. Find the number of common terms to the two sequences 17,21,25,...,417 and 16,21,26,...,466.

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14. If the continued product of three numbers in GP is 216 and the sum of their products in pairs is 156, then find the sum of three numbers.

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15. If $y = 3^{x-1} + 3^{-x-1}$ (where, x is real), then the leastvalue of y is

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Chapter 10

1. The equations of two sides of a triangle are $3x - 2y + 6 = 0$ and $4x + 5y - 20 = 0$ it the rauations of sides AB and AC of triangle ABC be = 0 and is (1, 1). Find the equation of the third side.

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2. The vertices of a reactangle ABCD are $A(-1,0)B(2,0), C(a,b)$ and $D(-1,4)$. Then the length of the diagonal AC is

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3. A triangle are$(6,0).(0,6)$ and $(6,6)$. If distance between circumcentre and orthocenter and distance between circumcentre and centroid are λ and u unit respectively, then (λ, u) lies on:

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4. Two sides of a parallelogram are along the lines x+y=3 and x=y+3=0. If its diagonals intersect at (2, 4) , then one of its vertices is

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5. If the pair of straight lines $x^2 - 2pxy - y^2 = 0$ and $x^2 - 2qxy - y^2 = 0$ be such that each pair bisects the angle between the other pair, then

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6. If in parallelogram $ABDC$, the coordinate of A, B and C are respectively $(1, 2)$, $(3, 4)$ and $(2, 5)$, then the equation of the diagonal AD is

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7. If one of the lines given by $6x^2 - xy + 4cy^2 = 0$ is $3x + 4y = 0$, then $c =$

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8. Suppose that the points $(h, k), (1, 2)$ and $(-3, 4)$ lie on the line L_1. If a line L_2 passing through the points (h, k) and $(4, 3)$ is perpendicular to L_1, then k/h equals

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9. If the sum of the slopes of the lines given by $x^2 - 2cxy - 7y^2 = 0$ is four times their product , then the value of c is

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10. The number of possible straight lines passing through point(2,3) and forming a triangle with coordiante axes whose area is 12 sq. unit is: a. one b. two c. three d. four

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11. Let $A(2, 3)$ and $B(-2, 1)$ be vertices of a triangle ABC. If the centroid of this triangle moves on the line $2x + 3y = 1$, then the locus of the vertex C is the line-

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12. The coordinates of the point P dividing the line segment joining the points A(1, 3) and B(4, 6) in the ratio 2:1 is

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13. If one of the lines of $my^2 + (1 - m^2)xy - mx^2 = 0$ is a bisector of the angle between the lines $xy = 0$, then m is 1 (b) 2 (c) $-\frac{1}{2}$ (d) -1

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14. If the two lines $x+(a-1)y=1$ and $2x+a^2y=1, (a \in R-\{0\})$ are perpendicular , then the distance of their point of intersection from the origin is

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15. Find the distance between the parallel lines $3x-4y+9=0 \; and \; 6x-8y-15=0.$

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Chapter 11

1. A hyperbola has its centre at the origin, passes through the point (4, 2) and has transverse axis of length 4 along the x-axis. Then the eccentricity of the hyperbola is

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2. If the tangent at the point on the circle $x^2 + y^2 + 6x + 6y = 2$ meets the straight ine $5x - 2y + 6 = 0$ at a point Q on the y- axis then the length of PQ is

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3. Let $A(4, -4)$ and B(9,6) be points on the parabola $y^2 = 4x$. Let C be chosen on the on the arc AOB of the parabola where O is the origin such that the area of ΔACB is maximum. Then the area (in sq. units) of ΔACB is :

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4. If the circles $x^2 + y^2 - 2x - 2y - 7 = 0$ and $x^2 + y^2 + 4x + 2y + k = 0$ cut orthogonally. If the length of the common chord of the circles is $\frac{m}{\sqrt{n}}$, then m + n is

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5. The length of the chord of the parabola $x^2 = 4y$ having equations $x - \sqrt{2}y + 4\sqrt{2} = 0$ is

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6. An infinite number of tangents can be drawn from $(1, 2)$ to the circle $x^2 + y^2 - 2x - 4y + \lambda = 0$. Then find the value of λ

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7. The equation of the latus rectum of a parabola is $x + y = 8$ and the equation of the tangent at the vertex is $x + y = 12$. Then find the length of the latus rectum.

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8. If the area of the triangle whose one vertex is at the vertex of the parabola, $y^2 + 4(x - a^2) = 0$ and the other two vertices are the points of intersection of the parabola and Y-axis, is 250 sq units, then a value of 'a' is

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9. The radius of the circle passing through the foci of $\frac{x^2}{16} + \frac{y^2}{9} = 1$, and having centre (0, 3) is

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10. Find the area of the largest rectangle with lower base on the x-axis and upper vertices on the curve $y = 12 - x^2$.

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11. The equation of a tangent to the parabola $y^2 = 8xisy = x + 2$. The point on this line from which the other tangent to the parabola is perpendicular to the given tangent is (1) $(- 1, 1)$ (2) $(0, 2)$ (3) $(2, 4)$ (4) $(- 2, 0)$

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12. If the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and the hyperbola $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$ coincide, then find the value

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13. In an ellipse, the distances between its foci is 6 and minor axis is $8.$ Then its eccentricity is

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14. An ellipse has OB as the semi-minor axis, $FandF'$ as its foci, and $\angle FBF'$ a right angle. Then, find the eccentricity of the ellipse.

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15. If PQ is a focal chord of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ which passes through $S \equiv (3, 0)$ and $PS = 2$ then length of chord PQ is

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Chapter 12

1. $\lim_{x \to 0} \frac{x \cot(4x)}{\sin^2 x \cot^2(2x)}$ is equal to

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2. $\lim -\left(x \to \frac{\pi}{4}\right) \frac{\cot^3 x - \tan x}{\cos\left(x + \frac{\pi}{4}\right)}$ is equal to (A) 8 (B) $4\sqrt{2}$ (C) $8\sqrt{2}$ (D) $2\sqrt{2}$

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3. $\lim_{x \to 0} \frac{\sin^2 x}{\sqrt{2} - \sqrt{1 + \cos x}}$ equals

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4. $\lim_{x \to 0} \frac{\tan 2x - x}{3x - \sin x} =$

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5. $\lim_{h \to 0} \frac{f(2h + 2 + h^2) - f(2)}{f(h - h^2 + 1) - f(1)}$ given that f'(2) = 6 and f'(1) = 4,

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6. $\lim_{x \to \frac{\pi}{2}} \left[x \tan x - \left(\frac{\pi}{2}\right)\sec x\right]$ is equal to

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7. Let $f(x) = \sqrt{x-1} + \sqrt{x+24-10\sqrt{x-1}}, 1 < x < 26$

be a real valued function, then $f'(x) \quad \text{for} \quad 1 < x < 26$, is

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8. Write the value of the derivative of $f(x) = |x-1| + |x-3|$ at $x = 2$

.

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9. The value of $\lim_{x \to 0} \left[\frac{a}{x} - \cot \frac{x}{a}\right]$ is

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10. Let $f(2)=4$ and $f'(2)=4$. $If \lim_{x\to 2}\frac{xf(2)-2f(x)}{x-2}=-a,$ then a is

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11. $\lim_{x\to\frac{\pi}{2}}\frac{\left[1-\tan\left(\frac{x}{2}\right)\right][1-\sin x]}{\left[1+\tan\left(\frac{x}{2}\right)\right][\pi-2x]^3}$

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12. Let $f: R\to R$ be a differentiable function satisfying $f'(3)+f'(2)=0$, Then $\lim_{x\to 0}\left(\frac{1+f(3+x)-f(3)}{1+f(2-x)-f(2)}\right)^{\frac{1}{x}}$ is equal to

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13. If $\lim_{x\to 1}\frac{x^3-1}{x-1}=\lim_{x\to k}\frac{x^4-k^4}{x^3-k^3}$, find the value of k.

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14. If $\lim_{x \to 1} \frac{x^2 - ax + b}{x - 1} = 5, \quad \text{then} \quad a + b$ is equal to

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15. The value of $\lim_{x \to 0} \frac{x \cos x - \log(1 + x)}{x^2}$ is

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Chapter 14

1. Average height & variance of 5 students in a class is 150 and 18 respectively. A new student whose height is $156cm$ is added to the group. Find new variance. (a) 20 (b) 22 (c) 16 (d) 14

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2. In a group of data, there are n observations, $x, x_2, \ldots, x_n$. If $\sum_{i=1}^{n}(x_i+1)^2 = 9n$ and $\sum_{i=1}^{n}(x_i-1)^2 = 5n$, the standard deviation of the data is

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3. The mean and standart deviation of five observations x_1, x_2, x_3, x_4, x_5 and are 10 and 3 respectively, then variance of the observation $x_1, x_2, x_3, x_4, x_5, -50$ is equal to (a) 437.5 (b) 507.5 (c) 537.5 (d) 487.5

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4. In a class of 100 students, there are 70 boys whose average marks in a subject is 75. If the average marks of the complete class is 72, then what is the average of the girls ?

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5. If in a frequency distribution, the mean and median are 21 and 22 respectively, then its mode is approximately (a) 20.5 (b) 22.0 (c) 24.0 (d) 25.5

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6. Suppose a population A has 100 observations $101, 102, \ldots\ldots\ldots\ldots\ldots, 200$ and another population B has 100 observations $151, 152, \ldots\ldots.250.$ If V_A and V_B represent the variances of the two populations respectively,then $\frac{V_A}{V_B}$ is (a) 1 (b) $\frac{9}{4}$ (c) $\frac{4}{9}$ (d) $\frac{2}{3}$

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7. In an experiment with 15 observations of x the following results were available $\sum x^2 = 2830 \sum x = 170$ one observation that was 20 was found to be wrong and it was replaced by its correct value of 30 Then the corrected variance is (1) 8.33 (2) 78 (3) 188.66 (4) 177.33

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8. Q52. If M.D. is 12, the value of S.D. will be:(a) 15(b) 12(c) 24(d) none of these

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9. Find the variance of the numbers 3,7,10,18,22.

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10. Q51. If 25% of the items are less than 20 and 25% are more than 40, the quartile deviation is(a) 10(b) 20(c) 30(d) none of these

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11. If the sum of the deviations of 50 observations from 30 is 50, then the mean of these observations is

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12. Mean and variance of five observations are 4 and 5.2 respectively. If three of these observations are $3, 4, 4$ then find absolute difference between the other two observations (A) 3 (B) 7 (C) 2 (D) 5

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13. If both the mean and the standard deviation of 50 observatios $x_1, x_2, \ldots. x_{50}$ are equal to 16, then the mean of $(x_1-4)^2, (x_2-4)^2, \ldots., (x_{50}-4)^2$ is

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14. Mean of 100 items is 49. It was discovered that three items which should have been $60, 70, 80$ were wrongly read as $40, 20, 50$ respectively. The correct mean is. (a) 48 (b) $82\frac{1}{2}$ (c) 50 (d) 80

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15. If the median of $\frac{x}{5}, \frac{x}{4}, \frac{x}{2}, x$ and $\frac{x}{3}$, where $x > 0$, is 8, find the value of x

HINT Arranging the observation in ascending we have $\frac{x}{5}, \frac{x}{4}, \frac{x}{3}, \frac{x}{2}, x$

$$\text{Median} = \frac{x}{3} = 8$$

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Chapter 15

1. Three of six vertices of a regular hexagon are chosen at random. The probability that the triangle with three vertices is equilateral is $1/2$ b. $1/5$ c. $1/10$ d. $1/20$

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2. Two numbers are selected randomly from the set $S = \{1, 2, 3, 4, 5, 6\}$ without replacement one by one. The probability that minimum of the two numbers is less than 4 is

A. $1/15$

B. $14/15$

C. $1/5$

D. $4/5$

Answer: 0.8

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3. Find the probability that in a random arrangement of the letters of the word UNIVERSITY the two Is do not come together.

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4. Two friends $A and B$ have equal number of daughters. There are three cinema tickets which are to be distributed among the daughters of $A and B$. The probability that all the tickets go to the daughters of A is 1/20. Find the number of daughters each of them have.

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5. A die is thrown. Let A be the event that the number obtained is greater than 3. Let B be the event that the number obtained is less than 5. Then $P(A \cup B)$ is (1) $\frac{3}{5}$ (2) 0 (3) 1 (4) $\frac{2}{5}$

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6. Five horses are in a race. Mr. A selects two of the horses at random and bets on them. The probability that Mr. A selected the winning horse is $3/5$ b. $1/5$ c. $2/5$ d. $4/5$

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7. If A and B are two enents such that $P(A \cup B) = \frac{3}{4}, P(A \cap B) = \frac{1}{4}, P(\overline{A}) = \frac{2}{3},$ then $P(\overline{A} \cap B)$ is equal to

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8. A book contains 1000 pages numbered consecutively. The probability that the sum of the digits of the number of a page is $9, is \frac{a}{b},$ then $a \times b$ =

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9. If the probability of a horse A winning a race is 1/4 and the probability of a horse B winning the same race is 1/5, then the probability that either of them will win the race is

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10. Dialing a telephone number an old man forgets the last two digits remambering only that these are different dialled at random. The probability that the numbe is dialled correctly, is equal to $\frac{1}{k}$, then k is

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11. If the odds favour of an event be 3/5, find the probability of the occurrence of the event.

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12. Out of 15 persons 10 can speak Hindi and 8 can speak English. If two persons are chosen at random, then the probability that one peron speaks Hindi only and the other speaks both Hindi and English is

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13. The probability that at least one of the event A and B occurs is 0.6. If A and B occur simultaneously with probability 0.2, then find $P(A) + P(B)$.

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14. Seven white balls and three black balls are randomly placed in a row. IF the parabability that no two black balls are placed adjacently, equals $\left(\frac{7}{a}\right)$, then the value of "a" is

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15. From 10,000 lottery tickets numbered from 1 to 10,000, one ticket is drawn at random. What is the probability that the number marked on the drawn ticket is divisible by 20

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Chapter 16

1. Let E = {1, 2, 3, 4} and F = {1, 2}. Then the number of onto functions from E to F is

A.

B.

C.

D.

Answer: 14

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2. Given the relation $R = \{(1, 2), (2, 3)\}$ on the set $A = \{1, 2, 3\}$, add a minimum number of ordered pairs so that the enlarged relation is symmetric, transitive and reflexive.

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3. Set A has 3 elements and set B has 4 elements. The number of injections that can be defined from A to B is

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4. If $f(x) = |x|$ and $g(x) = [x]$, then value of fog $\left(-\frac{1}{4}\right)$ + gof $\left(-\frac{1}{4}\right)$ is

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5. If $f(x) = \sin^2 x + \sin^2\left(x + \frac{\pi}{3}\right) + \cos x \cos\left(x + \frac{\pi}{3}\right) and g\left(\frac{5}{4} = 1,\right.$ then $(gof)(x)$ is __________

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6. For $x \in \left(0, \frac{3}{2}\right)$, let $f(x) = \sqrt{x}$, $g(x) = \tan x$ and $h(x) = \frac{1 - x^2}{1 + x^2}$.

If $\phi(x) = ((hof)og)(x)$, then $\phi\left(\frac{\pi}{3}\right)$ is equal to

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7. Let $f(x) = \frac{\alpha x}{x+1}, x \neq -1$. Then, for what value of α is $f[f(x)] = x$?

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8. If $f(x) = x^2 + 1$, then $\left|f^{-1}(17)\right| + \left|f^{-1}(-3)\right|$ will be

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9. If $f: R \to R, g: R \to R$ and $h: R \to R$ is such that $f(x) = x^2, g(x) = \tan x$ and $h(x) = \log x$, then the value of $\Big[ho(gof)$, if $x = \frac{\sqrt{\pi}}{2}$ will be

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10. Let R be the set of real numbers and the functions $f: R \to R$ and $g: R \to R$ be defined by $f(x) = x^2 + 2x - 3$ and $g(x) = x + 1$. Then the value of x for which $f(g(x)) = g(f(x))$ is

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11. Let $g(x) = 1 + x - [x]$ and $f(x) = \begin{cases} -1, & x < 0 \\ 0, & x = 0 \\ 1, & x > 0 \end{cases}$, then for all x, $f[g(x)]$ is equal to

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12. Let $f(x) = (x+1)^2 - 1 (x \geq -1)$. Then the number of elements in the set $S = \{x : f(x) = f^{-1}(x)\}$ is

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13. Let R be the set of real number and the mapping $f: R \rightarrow R$ and $g: R \rightarrow R$ be defined by $f(x) = 5 - x^2$ and $g(x) = 3x - 4$, then the value of (fog) (-1) is

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14. Let $f: R - \left\{\frac{5}{4}\right\} \rightarrow R$ be a function defines $f(x) = \frac{5x}{4x+5}$. The inverse of f is the map $g:$ Range $f \rightarrow R - \left\{\frac{5}{4}\right\}$ given by

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15. If $f: R \rightarrow R$ and $g: R \rightarrow R$ defined by $f(x) = 2x + 3$ and $g(x) = x^2 + 7$ then the values of x for which $f(g(x)) = 25$ are

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Chapter 17

1. The value of $\cot \sum_{n=1}^{19} \cot^{-1}\left(1 + \sum_{p=1}^{n} 2p\right)$ is equal to (a) $\frac{21}{19}$ (b) $\frac{19}{21}$ (c) $-\frac{19}{21}$ (d) $-\frac{21}{19}$

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2. The value of $\sin\left(2\tan^{-1}\frac{1}{3}\right) + \cos\left(\tan^{-1}2\sqrt{2}\right) is \frac{p}{q}$, then pq is

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3. If $\cos^{-1}\left(\frac{2}{3x}\right) + \cos^{-1}\left(\frac{3}{4x}\right) = \frac{\pi}{2}\left(x > \frac{3}{4}\right)$ and "x" is equal to $\frac{\sqrt{p}}{q}$, then the value of $(p - q)$ is :-

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4. If $\sin^{-1}x + \sin^{-1}y + \sin^{-1}z = \frac{3\pi}{2}$ then the value of $x^{100} + y^{100} + z^{100} - \frac{3}{x^{101} + y^{101} + z^{101}}$ is

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5. If α and β are the roots of the equation $x^2 - 4x + 1 = 0(\alpha > \beta)$ then find the value of $f(\alpha, \beta) = \frac{\beta^3}{2}\csc^2\left(\frac{1}{2}\tan^{-1}\left(\frac{\beta}{\alpha}\right) + \frac{\alpha^3}{2}\sec^2\left(\frac{1}{2}\tan^{-1}\left(\frac{\alpha}{\beta}\right)\right)\right.$

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6. The value of $\cos^{-1}\left(\frac{\cos(5\pi)}{3}\right) + \sin^{-1}\left(\frac{\sin(5\pi)}{3}\right)$ is $\frac{\pi}{2}$ (b) $\frac{5\pi}{3}$ (c) $\frac{10\pi}{3}$ (d) 0

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7. $\cos\left\{\cos^{-1}\left(-\frac{1}{7}\right) + \sin^{-12}\left(-\frac{1}{7}\right)\right\}$ =

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8. If $4\sin^{-1}x + \cos^{-1}x = \pi$, then: x=

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9. If $\alpha = \cos^{-1}\left(\frac{3}{5}\right), \beta = \tan^{-1}\left(\frac{1}{3}\right)$, where $0 < \alpha, \beta < \frac{\pi}{2}$, then $\alpha - \beta$ is equa to :

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10. If: $\tan^{-1} x = \sin^{-1}\left(\frac{3}{\sqrt{10}}\right)$, then: x=

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11. If $\sin^{-1}\left(\frac{x}{5}\right) + \cos ec^{-1}\left(\frac{5}{4}\right) = \frac{\pi}{2}$, then the value of x is

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12. If $\cos^{-1}\sqrt{p} + \cos^{-1}\sqrt{1-p} + \cos^{-1}\sqrt{1-q} = \frac{3\pi}{4}\text{than} : q =$

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13. The number of solution of the equation $\tan^{-1}(1+x)+\tan^{-1}(1-x)=\frac{\pi}{2}$ is

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14. IF $\tan^{-1}2x+\tan^{-1}3x=\frac{\pi}{4}$, then x=

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15. If $\angle A=90^\circ$ in the ΔABC, then $\tan^{-1}\left(\frac{c}{a+b}\right)+\tan^{-1}\left(\frac{b}{a+c}\right)$ is equal to

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Chapter 18

1. If $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$, then the matrix A^{-50} when $\theta = \frac{\pi}{12}$, is equal to

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2. Let $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$ and $10B = \begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & \alpha \\ 1 & -2 & 3 \end{bmatrix}$. If B is the inverse of A, then α is :

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3. How many 3×3 matrices M with entries from $\{0, 1, 2\}$ are there, for which the sum of the diagonal entries of $M^T Mis5?$ 126 (b) 198 (c) 162 (d) 135

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4. Let $P = \begin{bmatrix} 1 & 0 & 0 \\ 3 & 1 & 0 \\ 9 & 3 & 1 \end{bmatrix} Q = [q_{ij}]$ and $Q = P^5 + I_3$ then $\dfrac{q_{21} + q_{31}}{q_{32}}$ is equal to (A) 12 (B) 8 (C) 10 (D) 20

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5. If $A = \begin{bmatrix} x & 1 \\ 1 & 0 \end{bmatrix}$ and A^2 is the identity matrix, then x is equal to

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6. If $f(x) = x^2 + 4x - 5$ and $A = \begin{bmatrix} 1 & 2 \\ 4 & -3 \end{bmatrix}$, then f(A) is equal to

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7. Let $A = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}, (a \in R)$ such that $A^{32} = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ is the value of α is $\dfrac{\pi}{2^k}$, then the value of k is

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8. If $\begin{bmatrix} 1 & x & 1 \end{bmatrix}\begin{bmatrix} 1 & 2 & 3 \\ 0 & 5 & 1 \\ 0 & 3 & 2 \end{bmatrix}\begin{bmatrix} x \\ 1 \\ -2 \end{bmatrix} = O,$ then x =

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9. If $A = \begin{bmatrix} 0 & 2 & 0 \\ 0 & 0 & 3 \\ -2 & 2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 4 & 5 \\ 5 & -4 & 0 \end{bmatrix}$, then the element of third row and column in AB will be

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10. The total number of matrices $A = \begin{bmatrix} 0 & 2y & 1 \\ 2x & y & -1 \\ 2x & -y & \end{bmatrix} (x, y \in R, x \neq y)$ $f \text{ or } which A^T A = 3I_3$ is

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11. If $A = \begin{bmatrix} 4 & x+2 \\ 2x-3 & x+1 \end{bmatrix}$ is a symmetric matrix, then $x = ?$

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12. If $A = \begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$ then value of α for which $A^2 = B$, is

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13. If $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ and $A^{100} = 2k^k A,$ then the vlaue of k is

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14. If $A = \begin{bmatrix} ab & b^2 \\ -a^2 & -ab \end{bmatrix}$ and $A^n = 0$, then the minimum value of 'n' is

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15. The total number of matrices

$$A = \begin{bmatrix} 0 & 2y & 1 \\ 2x & y & -1 \\ 2x & -y & \end{bmatrix} (x, y \in R, x \neq y)$$

f or $which A^T A = 3I_3$ is

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Chapter 19

1. The system of linear equations

x + y + z = 2

2x + 3y + 2z = 5

$2x + 3y + (a^2 - 1)z = a + 1$

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2. Let $A = \begin{bmatrix} 5 & 5\alpha & \alpha \\ 0 & \alpha & 5\alpha \\ 0 & 0 & 5 \end{bmatrix}$. If $|A^2| = 25$, then $|\alpha|$ is equal to :

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3. If $0 < \theta < \pi$ and the system of equations

$(\sin\theta)x + y + z = 0$

$x + (\cos\theta)y + z = 0$

$(\sin\theta)x + (\cos\theta)y + z = 0$

has a non-trivial solution, then $\theta =$

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4. If $1, \omega, \omega^2$ are the cube roots of unity , then $\Delta = \begin{vmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^n & \omega^{2n} & 1 \\ \omega^{2n} & 1 & \omega^n \end{vmatrix}$ is equal to :

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5. If $a^2 + b^2 + c^2 = -2$ and $f(x) = \begin{vmatrix} 1 + a^2x & (1 + b^2)x & (1 + c^2)x \\ (1 + a^2)x & 1 + b^2x & (1 + c^2)x \\ (1 + a^2)x & (1 + b^2)x & 1 + c^2x \end{vmatrix}$,

then f(x) is a polynomial of degree

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6. Let $A = \begin{bmatrix} 2 & b & 1 \\ b & b^2 + 1 & b \\ 1 & b & 2 \end{bmatrix}$, $\text{where } b > 0$. Then, the minimum value of $\dfrac{\det(A)}{b}$ is

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7. The greatest value of for which the system of linear equations

$x - cy - cz = 0$

$cx - y + cz = 0$

$cx + cy - z = 0$

Has a non-trivial solution, is $\dfrac{1}{k}$. The value of k is ________.

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8. If $a_1, a_2, a_3 \ldots$ are in G.P. then the value of $\begin{vmatrix} \log a_n, \log a_{n+1}, \log a_{n+2} \\ \log a_{n+3}, \log a_{n+4}, \log a_{n+5} \\ \log a_{n+6}, \log a_{n+7}, \log a_{n+8} \end{vmatrix}$ is

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9. If $\begin{vmatrix} x^2+x & x+1 & x-2 \\ 2x^2+3x-1 & 3x & 3x-3 \\ x^2+2x+3 & 2x-1 & 2x-1 \end{vmatrix} = xA + B$ then

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10. The sum of the real roots of the equation

$\begin{vmatrix} x & -6 & -1 \\ 2 & -3x & x-3 \\ -3 & 2x & x+2 \end{vmatrix} = 0,$ is equal to

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11. If $p\lambda^4 + q\lambda^3 + r\lambda^2 + s\lambda + t = \begin{vmatrix} \lambda^2 + 3\lambda & \lambda - 1 & \lambda + 3 \\ \lambda + 1 & 2 - \lambda & \lambda - 4 \\ \lambda - 3 & \lambda + 4 & 3\lambda \end{vmatrix}$. then the

value of t is

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12. $|(\log)_3 512(\log)_4 3(\log)_3 8(\log)_4 9| \times |(\log)_2 3(\log)_8 3(\log)_3 4(\log)_3 4| =$

(a) 7 (b) 10 (c) 13 (d) 17

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13. If $B = \begin{bmatrix} 5 & 2\alpha & 1 \\ 0 & 2 & 1 \\ \alpha & 3 & -1 \end{bmatrix}$ is the inverse of a 3×3 matrix A, then the sum

of all values of α

for which det (A) + 1 =0, is

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14. l, m,n are the p^{th}, q^{th} and r^{th} term of a G.P. all positive, then $\begin{vmatrix} \log l & p & 1 \\ \log m & q & 1 \\ \log n & r & 1 \end{vmatrix}$ equals :

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15. If $\begin{vmatrix} x-1 & 5x & 7 \\ x^2-1 & x-1 & 8 \\ 2x & 3x & 0 \end{vmatrix} = ax^3 + bx^2 + cx + d,$ then c is equal to

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Chapter 20

1. Let $f:(-1, 1) \to R$ be a function defind by f(x) =max. $\left\{-|x|, -\sqrt{1-x^2}\right\}$. If K is the set of all points at which f is not differentiable, then K has set of all points at which f is not differentible, then K has exactly

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2. Suppose $f(x)$ is differentiable at $x=1$ and $\lim_{h\to 0}\frac{1}{h}f(1+h)=5$, then $f'(1)$ equal

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3. Let $f(a)=g(a)=k$ and their n^th order derivatives $f^n(a), g^n(a)$ exist and are not equal for some $n\in N$. Further, if

$$\lim_{x\to a}\frac{f(a)g(x)-f(a)-g(a)f(x)+g(a)}{g(x)-f(x)}=4$$, then the value of k, is

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4. Let S be the set of all points in $(-\pi,\pi)$ at which the Then, S is a subset of which of the following?

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5. For what value of k, function $f(x)=\begin{cases}\frac{k\cos x}{\pi-2x}, & \text{if } x\neq\frac{\pi}{2}\\ 3, & \text{if } x=\frac{\pi}{2}\end{cases}$ is continuous at $x=\frac{\pi}{2}$?

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6. If the function $f(X)=\begin{cases}(\cos x)^{1/x} & x\neq 0\\ k & x=0\end{cases}$ is continuous at x=0, then the value of k, is

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7. If the function f defined on $\left(\frac{\pi}{6},\frac{\pi}{3}\right)$ by $\begin{cases}\frac{\sqrt{2}\cos x-1}{\cot x-1}, & x\neq\frac{\pi}{4}\\ \text{k}, & x=\frac{\pi}{4}\end{cases}$ is continuous, then k is equal to

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8. The function $f(x) = (x^2 - 1)|x^2 - 3x + 2| + \cos(|x|)$ is not differentiable at (a)-1 (b)0 (c)1 (d)2

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9. Let $f(x) = 15 - |x - 10|, x \in R$. Then, the set of all values of x, at which the function, $g(x) = f(f(x))$ is not differentiable, is

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10. Let $f(x) = [3 + 4\sin x]$ (where [ ] denotes the greater integer function). If sum of all the values of 'x' in $[\pi, 2\pi]$ where f(x) fails to be differentiable is $\frac{k\pi}{2}$, then find the value of k.

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11. Let $f:[-1,3] \to R$ be defined as

$$\begin{cases} |x|+[x], & -1 \le x < 1 \\ x+|x|, & 1 \le x < 2 \\ x+[x], & 2 \le x \le 3, \end{cases}$$

where, [t] denotes the greatest integer less than or equal to t. Then, f is discontinuous at

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12. The function $f: R-\{0\} \to R$ given by $f(x)=\frac{1}{x}-\frac{2}{e^2x-1}$ can be made continuous at x=0 by defining f(0) as

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13. The derivative of $\tan^{-1}\left(\frac{\sin x-\cos x}{\sin x+\cos x}\right)$, with respect to $\frac{x}{2}$, where $\left(x \in \left(0, \frac{\pi}{2}\right)\right)$ is

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14. Let $f(x) = \frac{1 - \tan x}{4x - \pi}, x \neq \frac{\pi}{4}, x \in \left[0, \frac{\pi}{2}\right]$. If f(x) is continuous in $\left[0, \frac{\pi}{2}\right]$, then $f\left(\frac{\pi}{4}\right)$ is

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15. If $f(x+y) = f(x) \times f(y)$ for all $x, y \in R$ and $f(5) = 2, f'(0) = 3, then f'(5) =$

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Chapter 21

1. The maximum volume (in cu.m) of the right circular cone having slant height 3 m is

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2. If a curve passes through the point (1, -2) and has slope of the tangent at any point (x,y) on it as $\frac{x^2 - 2y}{x}$, then the curve also passes through the point

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3. The height of a right circular cylinder of maxium volume inscirbed in a sphere of radius 3 is

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4. The function $f(x) = \frac{x}{2} + \frac{2}{x}$ has a local minimum at $x = 2$ (b) $x = -2$ $x = 0$ (d) $x = 1$

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5. If $y = 4x - 5$ is a tangent to the curve $y^2 = px^3 + q$ at (2, 3), then

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6. If the curves $\frac{x^2}{a^2} + \frac{y^2}{12} = 1$ and $y^3 = 8x$ intersect at right angles, then the value of a^2 is equal to

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7. A stone thrown upwards, has its equation of motion $s = 490t - 4.9t^2$. The the maximum height reached by it is

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8. The minimum value of $4e^{2x} + 9e^{-2x}$ is

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9. Find the minimum value of $|x| + \left|x + \frac{1}{2}\right| + |x - 3| + \left|x - \frac{5}{2}\right|$.

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10. In the interval $[0, 1]$, the function $x^{25}(1-x)^{75}$ takes its maximum value at the point 0 (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) $\frac{1}{3}$

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11. A water tank has the shape of an inverted right circular cone, whose semi-vertical angle is $\tan^{-1}\left(\frac{1}{2}\right)$. Water is poured into it at a constant rate of 5 cu m/min. Then, the rate (in m/min) at which the level of water is rising at the instant when the depth of water in the tank is 10 m is

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12. If the tangent to the curve $y=\frac{x}{x^2-3}, x \in r\left(x \neq \pm\sqrt{3}\right)$, at a point $(\alpha, \beta) \neq (0, 0)$ on it is parallel to the line $2x+6y-11=0$, then

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13. If m is the minimu value of k for which the function $f(x) = x\sqrt{kx - x^2}$ is increasing in the interval [0,3] and M is the maximum value of f in the inverval [0,3] when h=m, then the ordered pair (m,M) is equal to

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14. If the function $f(x) = 2x^3 - 9ax^2 + 12x^2x + 1, wherea > 0,$ attains its maximum and minimum at $pandq$, respectively, such that $p^2 = q,$ then a equal to 1 (b) 2 (c) $\frac{1}{2}$ (d) 3

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15. If the normal to the curve $y = f(x)$ at the point $(3, 4)$ makes an angle $\frac{3\pi}{4}$ with the positive x-axis, then $f'(3) =$ (a) -1 (b) $-\frac{3}{4}$ (c) $\frac{4}{3}$ (d) 1

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1. Let f be a differentiable function from R to R such that $|f(x) - f(y)| \leq 2|x - y|^{\frac{3}{2}}$, for all $x, y \in R$. If $f(0) = 1$, $\text{then}_0^1 \int f^2(x)$ dx is equal to

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2. $\int_0^{\pi} |\cos x| dx$ is equal to

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3. If $\int_0^k f(t)dt = x^2 + \int_x^1 t^2 f(t)dt$, if $f'(1/2) is \frac{24}{5^k}$, then the vlaue of k is

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4. $I_n = \int_0^{\pi/4} \tan^n x \, dx$, then $\lim_{n \to \infty} n\left[I_n + I_{n+2}\right]$ is equal to (i) $\frac{1}{2}$ (ii) 1 (iii) ∞ (iv) 0

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5. Evaluate :

$$\lim_{n \to \infty} \frac{1^4 + 2^4 + 3^4 + \ldots + n^4}{n^5} - \lim_{n \to \infty} \frac{1^3 + 2^3 + \ldots + n^3}{n^5}$$

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6. Let f be a positive function. If $I_1 = \int_{1-k}^{k} x f[x(1-x)] \, dx$ and $I_2 = \int_{1-k}^{k} f[x(1-x)] \, dx$, where $2k - 1 > 0$. Then $\frac{I_1}{I_2}$ is

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7. Let $f: R \rightarrow R$ and $g: R \rightarrow R$ be continuous functions. Then the value of the integral $\int_{\frac{\pi}{2}}^{\frac{\pi}{2}} [f(x) + f(-x)][g(x) - g(-x)]dx$ is

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8. If $\int \frac{dx}{x^3(1+x^6)^{2/3}} = x.\, f(x).\, (1+x^6)^{1/3} + C$, then $f(x)$ is equal to

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9. The value of the integral $\int_0^1 x \cot^{-1}(1 - x^2 + 4x^4)dx$ is equal to $\frac{\pi}{4} - \frac{k}{2}$ In 2, (natural log ln) then k is

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10. If $\int x^5 e^{-x^2} dx = g(x)e^{-x^2} + C$, where C is a constant of integration, then g(-1) is equal to

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11. Let $f : R \to R$ be a continuously differentiable function such that $f(2) = 6$ and $f'(2) = \frac{1}{48}$. If $\int_6^{f(x)} 4t^3 dt = (x-2)g(x)$ than $\lim_{x \to 2} g(x)$ is equal to

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12. if $\int_\alpha^{\alpha+1} (dx)((x+\alpha)(x+\alpha+1)) = \log e\left(\frac{9}{8}\right)$ then number of values of α is

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13. Let $F(x) = f(x) + f\left(\frac{1}{x}\right)$, where $f(x) = \int_1^x \frac{\log t}{1+t} dt$. Then F (e) equals

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14. The value of $I = \int\limits_0^{\pi/2} \frac{(\sin x + \cos)^2}{\sqrt{1 + \sin 2x}} dx$ is

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15. The value of $\lim_{x \to 0} \frac{\int_0^{x^2} \sec^2 t dt}{x \sin x} dx$, is

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Chapter 23

1. The area (in sq. units) bounded by the parabola $y = x^2 - 1$, the tangent at the point (2,3) to it and the y-axis is

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2. Let f (x) be a continous function such that the area bounded by the curve $y = f(x)$ x-axis and the lines x=0 and

$x = ais\frac{a^2}{2} + \frac{a}{2}\sin a + \frac{\pi}{2}\cos a$, then $f\left(\frac{\pi}{2}\right)$ is

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3. The area of the region $A = \{(x, y), 0 \leq y \leq x|x| + 1 \text{ and } -1 \leq x \leq 1\}$ in sq. units, is

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4. The area of the region bounded by the curves y = | x – 2 l, x = 1, x = 3 and the x-axis is

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5. The area (in sq units) in the first quadrant bounded by the parabola, $y = x^2 + 1$, the tangent to it at the point (2, 5) and the coordinate axes is

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6. The area enclosed by $|x| + |y| = 1$ is

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7. The area of the region bounded by the parabola $y = x^2 + 2$ and the lines y = x, x = 0 and x = 3 is

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8. If area bounded by the curve $y^2 = 4ax$ and $y = mx$ is $a^2/3$, then the value of m, is

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9. The area of the region

$A = \{(x, y) \in R \times R \mid 0 \leq x \leq 3, 0 \leq y \leq 4, x^2 + 3x\}$is

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10. The area enclosed between the curve $y = \log_e(x + e)$ and the coordinate axes is

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11. The area (in sq units) of the region $A = \{(x, y) : x^2 \leq y \leq x + 2\}$ is

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12. The area bounded by the curves y=lnx, y=ln|x|, y=|lnx| and y=|ln||x| is

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13. The area (in sq units) of the region

$A = \left\{(x, y) : \frac{y^2}{2} \leq x \leq y + 4\right\}$ is

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14. If the area (in sq. units) of the region $\{(x, y) : y^2 \leq 4x, x + y \leq 1, x \geq 0, y \geq 0\}$ is $a\sqrt{2} + b$, then $a - b$ is equal to :

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15. The area of the region bounded by the curves $2x = y^2 - 1$ and $x = 0$

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Chapter 24

1. If y = y(x) is the solution of the differential equation, $x\frac{dy}{dx} + 2y = x^2$ satisfying y(1) = 1, then $y\left(\frac{1}{2}\right)$ is equal to

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2. Let $f:[0, 1] \rightarrow R$ be such that $f(xy) = f(x).\ f(y),$ for all $x, y \in [0, 1]$ and $f(0) \neq 0.$ If $y = y(x)$ satisfies the differential equation, $\frac{dy}{dx} = f(x)$ with $y(0) = 1,$ then $y\left(\frac{1}{4}\right) + y\left(\frac{3}{4}\right)$ is equql to

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3. Let $y = y(x)$ be the solution of the differential equation, $x\left(\frac{dy}{dx}\right) + y = x\log_e x,\ (x > 1)$ if $2y(2) = \log_e 4 - 1,$ then $y(e)$ is equal to: (a) $-\left(\frac{e}{2}\right)$ (b) $-\left(\frac{e^2}{2}\right)$ (c) $\frac{e}{4}$ (d) $\frac{e^2}{4}$

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4. The degree of the differential equation

$$x = 1\left(\frac{dy}{dx}\right) + \frac{1}{2!}\left(\frac{dy}{dx}\right)^2 + \frac{1}{3!}\left(\frac{dy}{dx}\right)^3 + \ldots..$$

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5. If m and n are degree and order of $\left(1+y_1^2\right)^{2/3}=y_2$, then the value of $\frac{\mathrm{m+n}}{\mathrm{m-n}}$ is

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6. The solution of the differential equation $\frac{d^3y}{dx^3}-8\frac{d^2y}{dx^2}=0$ safisfing $y(0)=\frac{1}{8}, y'(0)$ and $y(0)=1$ is equal to $\frac{1}{p}\left[\frac{e^{8x}}{8}-++\frac{7}{8}\right]$, then find the value of p.

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7. A particle starts at the origin and moves along the x-axis in such a way that its velocity at the point (x, 0) is given by the formula $\frac{dx}{dt}=\cos^2\pi x$. Then the particle never reaches the point on

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8. If $x(t)$ is a solution of $\frac{(1+t)dy}{dx}-ty=1$ and $y(0)=-1$ then $y(1)$ is (a) $(b)(c)-(d)\frac{1}{e}2(f)(g)(h)$ (i) (b) $(j)(k)e+(l)\frac{1}{m}2(n)(o)(p)$ (q) (c) $(d)(e)e-(f)\frac{1}{g}2(h)(i)(j)$ (k) (d) $(l)(m)(n)\frac{1}{o}2(p)(q)(r)$ (s)

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9. The solution of the equation $\frac{d^2y}{dx^2}=e^{-2x}$ is

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10. Let $y=y(x)$ be the solution of the differential equation, $(X^2+1)^2\frac{dy}{dx}+2x(x^2+1)y=1$ such that $y(0)=0$. If $\sqrt{a}y(1)=\frac{\pi}{32}$, then the value of $'a'$ is:

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11. The solution of the differential equation $x\frac{dy}{dx} + 2y = x^2 (X \neq 0)$ with $y(1) = 1$, is :

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12. If cos $x\frac{dy}{dx} - y\sin x = 6x$, $\left(0 < x < \frac{\pi}{2}\right)$ and $y\left(\frac{\pi}{3}\right) = 0$, then $y\left(\frac{\pi}{6}\right)$ is equal to :-

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13. If y= y(x) is the solution of the differential equation $\frac{dy}{dx} = (\tan x - y)\sec^2 x, x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, such that y (0)=0, than $y\left(-\frac{\pi}{4}\right)$ is equal to

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14. Consider the differential equation $y^2 dx + \left(x - \frac{1}{y}\right)dy = 0$ if $y(1) = 1$ then x is

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15. The order of the differential equation of the family of parabolas whose axis is the X-axis is

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Chapter 25

1. Let $\vec{a} = \hat{i} - \hat{j}, \vec{b} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{c}$ be a vector such that $\vec{a} \times \vec{c} + \vec{b} = \vec{0}$ and $\vec{a} \,.\, \vec{c} = 4$, then $\left|\vec{c}\right|^2$ is equal to:

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2. A particle acted on by constant forces $\vec{f} = 4\hat{i} + 3\hat{j} - 3\hat{k}$ and $\vec{g} = 3\hat{i} + \hat{j} - \hat{k}$ experiences a displacement from the point $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}$ to the point $\vec{b} = 5\hat{i} + 4\hat{j} + \hat{k}$. The total work done by the forces is

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3. Let $\vec{a} = \hat{i} + \hat{j} + \sqrt{2}\hat{k}$, $\vec{b} = b_1\hat{i} + b_2\hat{j} + \sqrt{2}\hat{k}$ and $\vec{c} = 5\hat{i} + \hat{j} + \sqrt{2}\hat{k}$ be three vectors such that the projection vector of $\vec{b}$ on $\vec{a}$ is $\vec{a}$.

If $\vec{a} + \vec{b}$ perpendicular to $\vec{c}$, then $\left|\vec{b}\right|$ is equal to

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4. Let $\vec{u} = \hat{i} + \hat{j}$, $\vec{v} = \hat{i} - \hat{j}$ and $\vec{w} = \hat{i} + 2\hat{j} + 3\hat{k}$. If $\widehat{n}$ is a unit vector such that $\vec{u} \cdot \widehat{n} = 0$ and $\vec{v} \cdot \widehat{n} = 0$ then find the value of $\left|\vec{w} \cdot \widehat{n}\right|$

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5. Let $\vec{a} = (\lambda - 2)\vec{a} + \vec{b}$ and $\vec{\beta} = (4\lambda - 2)\vec{a} + 3\vec{b}$ be two given vectors where vectors $\vec{a}$ and $\vec{b}$ are non-collinear. The value of $|\lambda|$ for which vectors $\vec{\alpha}$ and $\vec{\beta}$ are collinear, is _______.

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6. If $\vec{x}$ and $\vec{y}$ are two unit vectors and π is the angle between them then $\frac{1}{2}\left|\vec{c} - \vec{y}\right|$ is equal to

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7. Let $\sqrt{3i} + \hat{j}$, $\hat{i} + \sqrt{3j}$ and $\beta\hat{i} + (1 - \beta)\hat{j}$ respectively be the position vedors of the points A, B and C with respect the origin O. If the distance of C from the bisector of the acute angle between OA and OB is $\frac{3}{\sqrt{2}}$, then the sum all possible values of β is ________.

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8. The vectors $\overrightarrow{AB} = 3\hat{i} + 5\hat{j} + 4\hat{k}$ and $\overrightarrow{AC} = 5\hat{i} - 5\hat{j} + 2\hat{k}$ are the sides of a triangle ABC. The length of the median through A is

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

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10. If $\vec{a}, \vec{b}, \vec{c}$ be three vectors such that $\left[\vec{a}\,\vec{b}\,\vec{c}\right] = 4$ then $\left[\vec{a} \times \vec{b}\,\vec{b} \times \vec{c}\,\vec{c} \times \vec{a}\right]$ is equal to

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11. Let $\alpha \varepsilon R$ and the three vectors $\vec{a} = \alpha\hat{i} + \hat{j} + 3\hat{k}$, $\vec{b} = 2\hat{i} + \hat{j} - \alpha\hat{k}$ and $\vec{c} = \alpha\hat{i} - 2\hat{j} + 3\hat{k}$. Then the set $S = \left\{\alpha : \vec{a}, \vec{b}\right.$ and $\vec{c}$ are coplanat}:

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12. If $\begin{vmatrix} a & a^2 & 1+a^3 \\ b & b^2 & 1+b^3 \\ c & c^2 & 1+c^3 \end{vmatrix} = 0$ and vectors $(1, a, a^2)$, $(1, b, b^2)$ and $(1, c, c^2)$ are non-coplanar, then the value of abc +1 is

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13. If $\left|\vec{a}\right| = 5, \left|\vec{b}\right| = 4, \left|\vec{c}\right| = 3$ and $\vec{a} + \vec{b} + \vec{c} = 0,$ then the vlaue of $\left|\vec{a}, \vec{b} + \vec{b}.\vec{c} + \vec{c}, \vec{a}\right|,$ is

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14. If $\vec{a}, \vec{b}, \vec{c}$ are vectors such that $\vec{a} + \vec{b} + \vec{c} = 0$ and $\left|\vec{a}\right| = 7, \left|\vec{b}\right| = 5, \left|\vec{c}\right| = 3$ then angle between

vector $\vec{b}$ and $\vec{c}$ is

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15. Let $\vec{u}$, $\vec{v}$ and $\vec{w}$ be such that $|\vec{u}| = 1$, $|\vec{v}| = 2$ and $|\vec{w}| = 3$ if the projection of $\vec{v}$ along $h\vec{u}$ is equal to that of $\vec{w}$ along $\vec{u}$ and vectors $\vec{v}$ and $\vec{w}$ are perpendicular to each other then $|\vec{u} - \vec{v} + \vec{w}|$ equals

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Chapter 26

1. 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

$px + qy + r = 0$, then $p + q + r$ is

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2. A line makes an angle $\alpha, \beta, \gamma, \delta$ with the four diagonals of a cube, then

$\sin^2\alpha + \sin^2\beta + \sin^2\gamma + \sin^2\delta =$

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3. The number of lines which are equally inclined to the axes is :

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4. If the point $(2, \alpha, \beta)$ lies on the plane which passes through the points $(3, 4, 2)$ and $(7, 0, 6)$ and is perpendicular to the plane $2x - 5y = 15$, then $2\alpha - 3\beta$ is equal to:

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5. If the lines $\dfrac{x-1}{2} = \dfrac{y+1}{3} = \dfrac{z-1}{4} and \dfrac{x-3}{1} = \dfrac{y-k}{2} = \dfrac{z}{1}$ intersect, then find the value of k.

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6. The perpendicular distance from the origin to the plane containing the two lines, $\frac{x+2}{3}=\frac{y-2}{5}=\frac{z+5}{7}$ and $\frac{x-1}{1}=\frac{y-4}{4}=\frac{z+4}{7}$, is $\frac{p}{\sqrt{q}}$, then pq is

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7. If the straight lines $x=-1+s, y=3-\lambda s, z=1+\lambda s and x=\frac{t}{2}, y=1+t, z=2-t$, with paramerters $s and t$, respectivley, are coplanar, then find λ.

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8. If the line $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-2}{4}$ meets the plane, $x+2y+3z=15$ at a point P, then the distance of P from the origin is

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9. The length of the perpendicular from the origin to the plane $3x + 4y + 12z = 52$ is

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10. Let P be thte plane, which contains the line of intersection of the planws, $x + y + z - 6 = 0 \text{ and } 2x + 3y + z + 5 = 0$ and it is perpendicular to the xy-plane. Then the distance of the point $(0, 0, 256)$ from P is equal to $\frac{m}{\sqrt{n}}$, then the value of m,n is

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11. The distance of the point having position vector $-\hat{i} + 2\hat{j} + 6\hat{k}$ from the straight line passing through the point $(2, 3, -4)$ and parallel to the vector, $6\hat{i} + 3\hat{j} - 4\hat{k}$ is :

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12. If the plane $x + ay + z = 5$ has equal intercepts on axes, then the value of a is

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13. Distance between two parallel planes $2x + y + 2z = 8$ and $4x + 2y + 4z + 5 = 0$ is

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14. The radius of the circle in which the sphere $x^{I2} + y^2 + z^2 + 2z - 2y - 4z - 19 = 0$ is cut by the plane $x + 2y + 2z + 7 = 0$ is a. 2 b. 3 c. 4 d. 1

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15. The plane $x + 2y - z = 4$ cuts the sphere $x^2 + y^2 + z^2 - x + z - 2 = 0$ in a circle of radius

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Chapter 27

1. Two cards are drawn successively with replacement from a well-shuffled deck of 52 cards. Let X denote the random variable of number of aces obtained in the two drawn cards. Then P(X = 1) + P(X = 2) equals

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2. Two coins are available, one fair and the other two-headed. Choose a coin and toss it once; assume that the unbiased coin is chosen with. probability $\frac{3}{4}$. Given that the outcome is head the probability that the two-headed coin was chosen, is

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3. The chance of India winning toss is $3/4$. If it wins the toss, then its chance of victory is $4/5$ otherwise it is only $1/2$. Then chance of India's vectory is

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4. An urn contains 5 red and 2 green balls. A ball is drawn at random from the urn. If the drawn ball is green, then a red ball is added to the urn and if the drawn ball is red, then a green ball is added to the urn, the original ball is not returned to the urn. Now, a second ball is drawn at random from it. The probability that the second ball is red is

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5. If two events A and B are such that $P\left(A^C\right)$ = 0.3 and P(B) = 0.4 and $P\left(A \cap B^C\right)$ = 0.5, then $P\left[B \mid \left(A \cup B^C\right)\right]$ is equal to

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6. The probability of happening an event A in one trial is 0.4. Find the probability that the event A happens at least one in three independent trials.

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7. If the probability of hitting a target by a shooter, in any shot is 1/3, then the minimum number of independent shots at the target required by him so that the probability of hitting the target at least once is greater than $\frac{5}{6}$ is

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8. Two aeroplanes I and II bomb a target in succession. The probabilities of I and II scoring a hit correctly are 0.3 and 0.2 respectively. The second plane will bomb only if the first misses the target. The probability that the target is hit by the second plane is

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9. Four persons can hit a target correctly with probabilities $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ and $\frac{1}{8}$ respectively. If all hit at the target would be hit, is

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10. A die is tossed 5 times. Getting and odd number is cosidered a success. Then, the variance of distribution of success, is

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11. Assumes that each born child is equally likely to be a boy or a girl. If two families have two children each, if conditional probability that all children are girls given that at least two are girls is k, then $\frac{1}{k} =$

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12. If X follows a binomial distribution with parameters $n = 6$ and p. If $4(P(X = 4)) = P(X = 2)$, then $P =$

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13. A problem in mathematics is given to three students A, B, C and their respective probability of solving the problem is 1/2, 1/3 and 1/4. Probability that the problem is solved is $3/4$ b. $1/2$ c. $2/3$ d. $1/3$

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14. The probability that A speaks truth is 4/5 , while this probability for B is 3/4 . The probability that they contradict each other when asked to speak on a fact is

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15. Minimum number of times a fair coin must be tossed so that the probility of gettig atleast one head is more than 99% is

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