A Valuable material from

Class 11

PRITEDUCATION

PRACTISE! PERFORM! PERFECT!

Think Question Papers, Think Priteducation!

A COLLECTION OF

COMPULSORY QUESTIONS

SUBJECT:

MATHEMATICS

SS PRITHVI

UPDATED ON: *6/11/2023, 12:39 PM*

Prove that $\log_4 2 - \log_8 2 + \log_{16} 2 - \cdots = 1 - \log_e 2$.

In a ΔABC, if $\tan\frac{A}{2} = \frac{5}{6}$ and $\tan\frac{C}{2} = \frac{2}{5}$, then show that a, b, c are in A.P.

If $A = \begin{bmatrix} 4 & 2 \\ -1 & x \end{bmatrix}$ and $(A-2I)(A-3I) = O$, find the value of x.

Evaluate : $\lim_{x\to 0}\frac{\sqrt{x+2}-\sqrt{2}}{x}$.

Compute: 9^7

Find the last two digits of the number: 3^{600}

If $f(x) = y = \frac{ax-b}{cx-a}$, then prove that $f(y) = x$.

Find the value of $\frac{1}{\log_x(yz)+1} + \frac{1}{\log_y(zx)+1} + \frac{1}{\log_z(xy)+1}$.

Find $f'(2)$ and $f'(4)$ if $f(x) = |x-3|$.

Solve : $\sqrt{3}\sin x + \cos x = 2$.

Find $f'(x)$, if $f(x) = \sin|x|$, by removing the modulus sign.

Verify the continuity at the point $x=0$ for the function $f(x) = \begin{cases} \frac{\sin 3x}{x} + 1 & \text{if } x \neq 0 \\ 2 & \text{if } x = 0 \end{cases}$

Is it correct to say $A \times A = \{(a, a) : a \in A\}$? Justify your answer.

Construct a suitable domain X such that $f : X \to \mathbf{N}$ defined by $f(n) = n+3$ to be one to one and onto.

Find dy/dx if $x^2+y^2=1$.

Evaluate : $\int \left[\frac{12}{(4x-5)^3} + \frac{6}{3x+2} + 16e^{4x+3} \right] dx$.

Differentiate x^x with respect to x.

If $a\sin^2\theta + b\cos^2\theta = c$, show that $\tan^2\theta = \frac{c-b}{a-c}$.

Evaluate : $\lim_{x \to 1} \frac{(x + x^2 + x^3 + \dots + x^n) - n}{x - 1}$.

If $y = \tan^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ find y'.

If $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}$, $\vec{b} = -3\hat{i} + 4\hat{j} - 5\hat{k}$ then find the value of $\vec{a} \cdot \vec{b}$.

Differentiate $y = \tan^2 4x$ with respect to x.

Find the equation of the line passing through the point (5, 2) and perpendicular to the line joining (2, 3) and (3, −1).

A committee of 7 has to be formed from 9 men and 4 women. In how many ways can this be done when the committee consists exactly 3 women?

Integrate $(x-11)^7$ with respect to x.

A die is rolled. If it shows an even number, then find the probability of getting 6.

Integrate $\cos 3x$ with respect to x.

Find the distinct permutation of the letters of the word MATHEMATICS.

Evaluate : $\lim_{n\to\infty}\left[6^n + 5^n\right]^{\frac{1}{n}}$

If ${}^nC_{r-1} = 36$, ${}^nC_r = 84$ and ${}^nC_{r+1} = 126$ then find the value of r.

If y = $e^{\sin x}$, find dy/dx.

Find the value of tan 165°.

Find the value of: cosec (-1410°).

Solve $2x^2+x-15 \leq 0$.

Find the number of subsets of A if $A = \{x : x = 4n+1, 2 \leq n \leq 5, n \in N\}$.

Show that the relation xy = −2 is a function for a suitable domain. Find the domain and the range of the function.

If $\mathscr{P}(A)$ denotes the power set of A, then find $n(\mathscr{P}(\mathscr{P}(\mathscr{P}(\emptyset))))$.

Write $f(x) = x^2+5x+4$ in completed square form.

If n (A) = 10 and n (A ∩ B) = 3 , find $n((A \cap B)' \cap A)$.

Find the range : $\frac{1}{2\cos x - 1}$.

If A = 30° then find the value of $2\sin^2 A + \cos 2A$.

Let f and g be the two functions from R to R defined by f (x) = 3x - 4 and g(x) = x^2 + 3 . Find gof and fog.

If n(A ∩ B) = 3 and n(AUB) = 10, then find n(P (A Δ B))

Prove $\log\frac{a^2}{bc} + \log\frac{b^2}{ca} + \log\frac{c^2}{ab} = 0$

Find the number of solutions of $x^2 + |x - 1| = 1$

Find the value of sin 690°.

Find all values of x that satisfies the inequality $\frac{2x+3}{(x+2)(x+4)} < 0$

If $(x^{1/2} + x^{-1/2})^2 = 9/2$, then find the value of $(x^{1/2} - x^{-1/2})$ for $x > 1$.

If $x = \sqrt{2} + \sqrt{3}$ find $\frac{x^2+1}{x^2-2}$.

Compute $\log_9 27 - \log_{27} 9$.

Let f and g be two functions from R to R denfined by f(x) = 3x - 4 and g (x) = x^2+ 3. find gof, fog.

Solve: $\frac{x+1}{x+3} < 3.$

Find the value of n if $\frac{1}{8!} + \frac{1}{9!} = \frac{n}{10!}$

Prove that the equation to the straight lines through the origin, each of which makes an angle α with the straight line $y = x$ is $x^2 - 2xy \sec\alpha + y^2 = 0$.

Resolve into partial fractions: $\frac{3x+1}{(x-2)(x+1)}$.

Find the value of $\sin 2\theta$, when $\sin\theta = \frac{12}{13}$, θ lies in the first quadrant.

Find the locus of a point P moves such that its distances from two fixed points A(1, 0) and B(5, 0) are always equal.

Find the equations of a parallel line and perpendicular line passing through the point (1, 2) to the line $3x + 4y = 7$

Solve : $|5x - 12| < -2$

If $\frac{1}{7!} + \frac{1}{9!} = \frac{A}{10!}$, find A.

If in two circles, arcs of the same length subtend angles 60° and 75° at the centre, Find the ratio of their radii.

Express the equation $\sqrt{3}\,x - y + 4 = 0$ in the slope - intercept form.

Prove that $\cot(A + B) = \frac{\cot A \cot B - 1}{\cot A + \cot B}$

Find the general solution of $\sin \theta = \frac{-\sqrt{3}}{2}$.

The slope of one of the lines $ax^2 + 2hxy + by^2 = 0$ is three times the other. Show that $3h^2 = 4ab$.

In how many ways the letters of the word PENCIL be arranged so that N is always next to E?

Prove that $\cos(A+B)\cos(A-B) = \cos^2 B - \sin^2 A$.

Find the equation of the straight lines passing through (8, 3) and having intercepts whose sum is 1.

Prove that $\cos(A+B)\cos(A-B) = \cos^2 A - \sin^2 B = \cos^2 B - \sin^2 A$.

Find the value of $\tan \pi/12$.

Prove that $n! + (n + 1)! = n!\,(n+2)$.

Find the equation of the straight line passing through the points (1,1) and (5,8).

Write the identities of cos2A.

Find 4 numbers G_1, G_2, G_3, G_4 so that the sequence $12, G_1, G_2, G_3, G_4, 3/8$ is in geometric progression.

Find the distinct permutations of the letters of the word MISSISSIPPI.

Find the value of $\cos 15^\circ$.

If A and B are square matrices of order 3 such that $|A| = -1$, $|B| = 3$ find the value of $|3AB|$

Find $(\vec{a}+3\vec{b}).(2\vec{a}-\vec{b})$ if $\vec{a} = \vec{i}+\vec{j}+2\vec{k}$ and $\vec{b} = 3\vec{i}+2\vec{j}-\vec{k}$

P.T. medians of a triangle concurrent by vector method.

Find the area of the triangle whose vertices are (−2, −3), (3, 2), (−1, −8).

For any two vectors $\bar{a}$ and $\bar{b}$ prove that $|\bar{a} \times \bar{b}|^2 + (\bar{a}.\bar{b})^2 = |\bar{a}|^2 |\bar{b}|^2$

Find the angle between the vectors $5\hat{i}+3\hat{j}+4\hat{k}$ and $6\hat{i}+8\hat{j}+\hat{k}$.

Prove that $\lim_{x \to a} \frac{x^n - a^n}{x - a} = na^{n-1}$.

Evaluate $\lim_{x \to 0} \frac{x^4 - 16}{x - 2}$

Construct the matrix $A = [a_{ij}]_{3\times3}$ where $a_{ij} = i - j$ state whether A is symmetric or skew - symmetric.

If f and g are continuous functions with f(3) = 5 and $\lim_{x \to 3} [2f(x) - g(x)] = 4$ find g(3). (6)

Show that $\begin{vmatrix} x+2a & y+2b & z+2c \\ x & y & z \\ a & b & c \end{vmatrix} = 0$

For what value of θ in $[0, 2\pi]$ such that matrix $\begin{vmatrix} 2\sin\theta - 1 & \sin\theta & \cos\theta \\ \sin(\theta+\pi) & 2\cos\theta - \sqrt{3} & \tan\theta \\ \cos(\theta-\pi) & \tan(\pi-\theta) & 0 \end{vmatrix}$ is Skew symmetric. Also write down the Skew - symmetric matrix.

For any two vector $\bar{a}$ and $\bar{b}$, Prove that i) $|\bar{a}+\bar{b}| \le |\bar{a}| + |\bar{b}|$ and ii) $|\bar{a}.\bar{b}| \le |\bar{a}|\,|\bar{b}|$

a) By vector method, prove that internal angle bisectors of a triangle are concurren

b) If x, y, z are different, $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0$ then show that $xyz + 1 = 0$.

Evaluate $\begin{vmatrix} 2014 & 2017 & 0 \\ 2020 & 2023 & 1 \\ 2023 & 2026 & 0 \end{vmatrix}$.

For any vector $\vec{r}$ prove that $\vec{r} = (\vec{r}.\hat{i})\hat{i} + (\vec{r}.\hat{j})\hat{j} + (\vec{r}.\hat{k})\hat{k}$.

$|\vec{a}| = 5$, $|\vec{b}| = 6$, $|\vec{c}| = 7$ and $\vec{a} + \vec{b} + \vec{c} = \vec{0}$ then find the value of $\vec{a}.\vec{b} + \vec{b}.\vec{c} + \vec{c}.\vec{a}$

If $\bar{a}, \bar{b}$ and $\bar{c}$ are three unit vectors satisfying $\bar{a} - \sqrt{3}\bar{b} + \bar{c} = \bar{0}$ then find the angle between $\bar{a}$ and $\bar{c}$.

For any two vectors $\vec{a}$ and $\vec{b}$ prove that

$|\vec{a} \times \vec{b}|^2 + (\vec{a}.\vec{b})^2 = |\vec{a}|^2 |\vec{b}|^2$

Find the area of the triangle whose vertices are A(3, -1,2) B(1, -1, -3) and C(4, -3, 1)

Differentiate : $y = x \log x$ w.r.t x

A die is rolled. If it shows an odd number, find the probability of getting 5.

Integrate with respect to x : $(1+x^2)^{-1}$

If $y = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots\dots\dots$, then prove that $\frac{dy}{dx} = y$.

Given that P(A)=0.52 , P(B)=0.43 and P(A∩ B)=0.24 , find P($A \cap \bar{B}$) .

An integer is chosen at random from the first ten positive integers.Find the Probability that it is i) an even number ii) multiple of three .

If $y=\sqrt{\sin\sqrt{x}}$ find $\frac{dy}{dx}$.

Find the general solution of tan4x = cot 2x.

Prove that $((A \cup B' \cup C) \cap (A \cap B' \cap C')) \cup ((A \cup B \cup C') \cap (B' \cap C')) = B' \cap C'$.

Integrate the following functions with respect to x : $\frac{1}{\sqrt{x+3}-\sqrt{x-4}}$

A single card is drawn from a pack of 52 cards. What is the probability that the card is an Ace are King.

(Playing cards based sums deleted acc. To the 2023-24 academic years' portion.)

If A and B are mutually exclusive events then $P(A) = \frac{3}{8}$, $P(B) = \frac{1}{8}$, then find $P(\bar{A} \cup \bar{B})$.

Consider the function $f(x) = \sqrt{x}$, $x > 0$. Does $\lim_{x \to 0} f(x)$ exist?

Prove that the points whose position vectors $2\hat{i}+4\hat{j}+3\hat{k}$, $4\hat{i}+\hat{j}+9\hat{k}$ and $10\hat{i}-\hat{j}+6\hat{k}$ from a right angled triangle.

Find the distance between the parallel lines 3x−4y+5 = 0 and 6x−8y−15 = 0.

Differentiate: $x^y=y^x$
