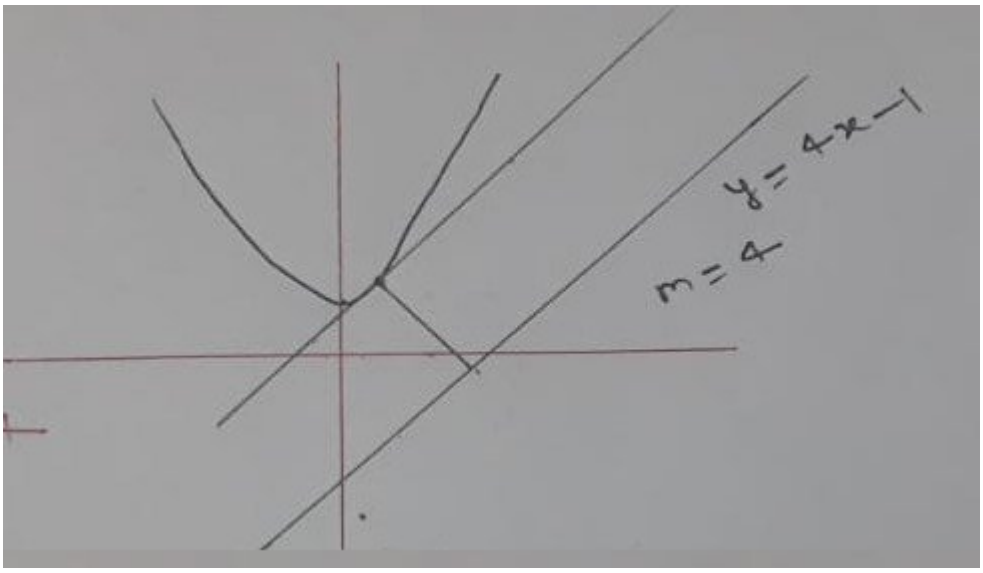
24 Feb 2021 Evening Slot

Maths - Questions and solutions

1.



$y = x^2 + 4$
$\frac{dy}{dx} = 2x$
$2x = 4$
$x = 2$

$y = x^2 + 4$
$y = 4 + 4 = 8 \text{ (at } x = 2)$

$\text{Point } (2, 8)$

2.

$x - 2y = 1$
$x - y + kz = -2$
$ky + 4z = 6$

$$A = \begin{vmatrix} 1 & -2 & 0 \\ 1 & -1 & k \\ 0 & k & 4 \end{vmatrix} = \left(-4 - k^2\right) + 2(4) = -k^2 + 4$$

For unique lolutien
$\Delta \neq 0$
$\Rightarrow -k^2 + 4 \neq 0$
$\Rightarrow k \neq \pm 2$

:, The lystem has unique folution
if $k \neq 2, k \neq -2$.

Solution 3

$\mathbf{p}$	$\mathbf{q}$	$\neg(\neg\mathbf{p} \wedge (\mathbf{p}\ \mathbf{V}\ \mathbf{q}))$
F	F	T
F	T	F
T	F	T
T	T	T

$\mathbf{p}$	$\mathbf{q}$	$(\mathbf{pV}\neg\mathbf{q})$
F	F	T
F	T	F
T	F	T
T	T	T

Correct Answer $p \vee \sim q$

Solution 4

$$\int_1^3 \left[x^2 - 2x - 2\right] dx$$
$$= \int_1^2 -3dx - \int_1^{\sqrt{2}+1} 2dx - \int_{\sqrt{2}+1}^{\sqrt{3}+1} 1dx + \int_{\sqrt{3}+1}^3 0dx$$
$$= -\left[(6-3) + 2\sqrt{2} + 2 - 4 + \sqrt{3} + 1 - \sqrt{2} - 1\right]$$
$$= -1 - \sqrt{3} - \sqrt{2}$$

3.

a,b,c are in A.P.

2b = a+c

(a,c), (2,b), (a,b) are vertext of triangle

$$\text{Centroid} = \left(\frac{10}{3}, \frac{7}{3}\right)$$

$$\frac{a+2+a}{3} = \frac{10}{3} \Rightarrow a = 4$$

$$\frac{c+b+b}{3} = \frac{7}{3} \Rightarrow a + 2b = 7$$

a,b,c are in A.P.

2b = a+c

2b = 4 + c

$$b = 2 + \frac{c}{2}$$

So,

c + 4 + c = 7

$$c = \frac{3}{2}$$

$$c = \frac{11}{4}$$

$$16x^2 + 11x + 4 = 0$$

$$\alpha^2 + \beta^2 - \alpha\beta = (\alpha + \beta)^2 - 3\alpha\beta$$

$$= \frac{11}{\frac{121}{256}} - \frac{3}{4}$$
$$= \frac{-71}{256}$$

18.

$$x^2 + 9y^2 = 9$$
$$2x + 18y\frac{dy}{dx} = 0$$
$$\frac{dy}{dx} = \frac{x}{9y}$$

$$= -\frac{3\sqrt{3}}{2 \times \frac{1}{2} \times 9}$$
$$= \frac{-1}{\sqrt{3}}$$