North South University

Department of Mathematics and Physics

Quiz 1

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Ans. to the ques. no. 01

We need to find an equation which is perpendicular to the line : $y = \frac{1}{2}x + 4$ ... (i)

and containing the point $(1, -2)$

From the equation no (i) we find that,

$$\text{slope, } m_1 = \frac{1}{2}$$

As the equation is perpendicular with equation (i),

Hence, $m_1 \times m = -1$

$$\Rightarrow \frac{1}{2} \times m = -1$$

$$\Rightarrow m = -1 \times \frac{2}{1}$$

$$\therefore m = -2$$

So, slope of the equation is -2 and the containing point is $(1, -2)$.

By using point - slope form of an equation,

$$y + 2 = -2(x - 1)$$

$$y + 2 = -2x + 2$$

$$\therefore 2x + y = 0$$

Thus the equation is $2x + y = 0$ Ans

Ans. to the ques. no. 02

Given that,

the equation is $x^2 = -4y^2 + 4$

And the points are $(0,1)$; $(2,0)$; $(\frac{1}{2}, 2)$;

For point $(0,1)$,

Let us substitut the point on the given equation,

$$0^2 = -4 \cdot 1^2 + 4$$

$$\Rightarrow 0 = -4 + 4$$

$$\therefore 0 = 0 \quad ; \text{ which is true.}$$

Thus the point is on the graph of the given equation.

For point $(2,0)$,

Let us substitute the point on the given equation.

$$2^2 = -4.0^2 + 4$$

$$\Rightarrow 4 = 0 + 4$$

$$\therefore 4 = 4 \quad ; \text{ which is true.}$$

Thus the point is on the graph of the given equation.

For point $(\frac{1}{2}, 2)$.

Let us substitut the point on the given equation

$$(\frac{1}{2})^2 = -4.2^2 + 4$$

$$\frac{1}{4} = -16 + 4$$

$\frac{1}{4} = -12$; which is not true.

Thus the point is not on the graph of the given equation.

Ans. to the que. no. 03

Given that,

The equation of a circle is,

$$3(x+1)^2 + 3(y-1)^2 = 6$$

$$\Rightarrow 3\{(x+1)^2 + (y-1)^2\} = 6$$

$$\Rightarrow (x+1)^2 + (y-1)^2 = 2 \quad \cdots\cdots (i)$$

$$\therefore \{x-(-1)\}^2 + \{y-(1)\}^2 = (\sqrt{2})^2 \quad \cdots (ii)$$

The general form of a circle is,

$$(x-h)^2 + (y-k)^2 = r^2 \quad \cdots (ii)$$

Here, center $= (h, k)$

and radius $= r$

By considering the equation (i) and (ii) we get that,

$$h = -1$$

$$k = 1$$

and $r = \sqrt{2}$

Thus the center is $(-1, 1)$

and radius is $\sqrt{2}$.

In order to find the x-intercept we let us put $y = 0$ in the given equation and solve it for x.

$$3(x+1)^2 + 3(0-1)^2 = 6$$

$$3(x+1)^2 + 3 = 6$$

$$(x+1)^2 = \frac{6-3}{3} = 1$$

$$\therefore x+1 = \sqrt{1} = \pm 1$$

$\therefore x+1 = +1$ and $x+1 = -1$

$\therefore x = 0$ $\therefore x = -2$

Thus the x intercepts are $0, -2$.

In order to find the y-intercept let us put $x = 0$ in the given equation and solve it for y.

$$3(0+1)^2 + 3(y-1)^2 = 6$$

$$3 + 3(y-1)^2 = 6$$

$$3(y-1)^2 = 3$$

$$(y-1)^2 = 1$$

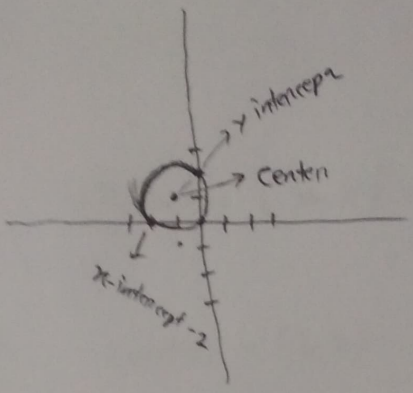
$$y - 1 = \sqrt{1} = \pm 1$$

$\therefore y - 1 = 1$ and $y - 1 = -1$

$y = 2$ $\therefore y = 0$

Thus the y intercepts are $2, 0$.

Circle



Ans to the queno. 04

Given that

End point of a diameter at $(1, 4)$ and $(-3, 2$

Using mid point formula,

- midpoint = center $= (h, k) = \left(\frac{1-3}{2}, \frac{4+2}{2}\right.$

$= (-1, 3)$

By using distance formula,

radius, r = d (enpoint (1,4) and center (-1, 3))

$= \sqrt{(-1-1)^2 + (3-4)^2}$

$= \sqrt{4+1} = \sqrt{5}$

We know that general equation of a circle is

$$(x-h)^2 + (y-k)^2 = r^2$$

Here, center $= (h, k)$

radius, $= r$

Thus the equation is,

$$(x+1)^2 + (y-3)^2 = 5$$

In order to find x-intercept let us put $y = 0$ again in the given equation and solve it for x.

$$(x+1)^2 + (0-3)^2 = 5$$

$$(x+1)^2 + 9 = 5$$

$$(x+1)^2 = -4$$

$$x+1 = \pm\sqrt{-4} \text{ ; undefined}$$

~~Thus x-intercept is -5.~~

Thus there is no x-intercept or x-intercept is undefined.

In order to find y-intercept let us put $x=0$ in the given equation and solve it for y.

$$(0+1)^2 + (y-3)^2 = 5$$

$$1 + (y-3)^2 = 5$$

$$(y-3)^2 = 4$$

$$y-3 = \pm 2$$

$$y = \pm 2 + 3$$

$\therefore$ $y = 5$ and 1

Thus y intercepts are 5 and 1.

Ans. to the ques. no. 5