

# Discussion Assignment

Jasper Albert Nri

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## Introduction

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

- **Does the equation determine a relation between  $x$  and  $y$**

Yes the above equation clearly depicts a relationship between  $x$  and  $y$ , with  $(x, y)$  being points on a circle of radius 1 and center  $(0, 2)$ .

- **Can the variable  $x$  be seen as a function of  $y$**

**Yes it can**

This can be achieved by making  $x$  the subject of the equation given above. we can express  $x$  as a function of  $y$  like  $x = g(y)$

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

Subtracting  $(y - 2)^2$  from both sides

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

Next, we take the Square root of both the LHS and RHS

$$x = \pm\sqrt{1 - (y - 2)^2}$$

Once this has been done we are left with an expression of  $x = g(y)$  and this expresses  $x$  as a function of  $y$ , because for any value of  $y$  placed into the equation

$$x = \pm\sqrt{1 - (y - 2)^2}$$

there would be an equivalent value of  $x$  gotten from it.

- **Can the variable  $y$  be seen as a function of  $x$**

**Yes it can**

Just like with the variable  $x$ ,  $y$  can also be seen as a function of  $x$  we can achieve this by making  $y$  the subject of the equation

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

and we start by subtracting  $x^2$  from both sides of the equation

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

Next we open the brackets on the LHS by taking the square root of both the LHS and the RHS

$$y - 2 = \sqrt{1 - x^2}$$

We then add 2 to both sides, so that we are left with expression

$$y = 2 \pm \sqrt{1 - x^2}$$

And this equation satisfies the expression of  $y = h(x)$  and proves that the variable  $y$  can be seen as a function of  $x$

- **What will be the domain for these two functions? For the First function that expresses  $x$  as a function of  $y$ ,**

The domain would be

$$1 - (y - 2)^2 \geq 0$$

$$(y - 2)^2 \leq 1$$

$$y - 2 \leq \pm\sqrt{1}$$

$$-1 < y - 2 < 1$$

Therefore the domain for this equation is

$$1 < y < 3$$

For the Second function that expresses  $y$  as a function of  $x$ ,

The domain would be

$$1 - x^2 \geq 0$$

$$x^2 \leq 1$$

$$x \leq \pm\sqrt{1}$$

$$-1 \leq x \leq 1$$

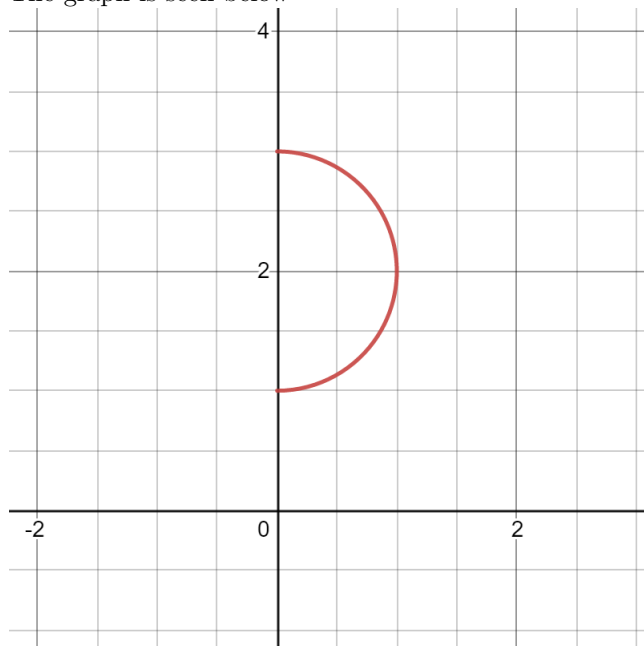
Therefore the domain for this function is

$$-1 \leq x \leq 1$$

- What are the graphs of these two functions?  
For the function that expresses  $x$  as a function of  $y$  i.e

$$x = g(y)$$

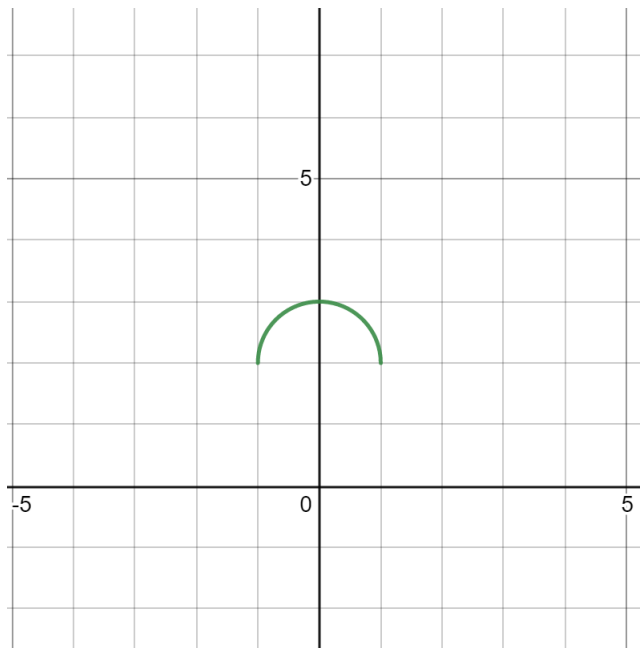
The graph is seen below



For the function that expresses  $y$  as a function of  $x$  i.e

$$y = h(x)$$

The graph is seen below



- Are there points of the coordinate axes that relate to  $(0, 2)$  by means of  $R$

Yes all points on the circle has a distance of 1 to the center of the circle at  $(0, 2)$