# MAT 1275, Classwork18, Fall2024

ID:_____ Name:_____

1. Compare the graph of $(x-1)^2+(y-2)^2=4$ with the graph of $x^2+y^2=4$. What do you see?

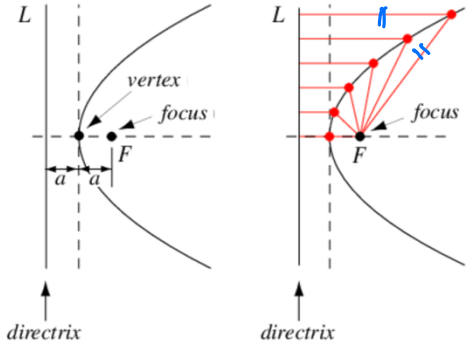
The graph of $(x-1)^2+(y-2)^2=4$ is a shifting of the graph of $x^2+y^2=4$ from center $(0,0)$ to center $(1,2)$

2. Shifting of the circle:

Center of $x^2+y^2=4$: ( 0 , 0 )

Center of $(x-1)^2+(y-2)^2=4$: ( 1 , 2 )

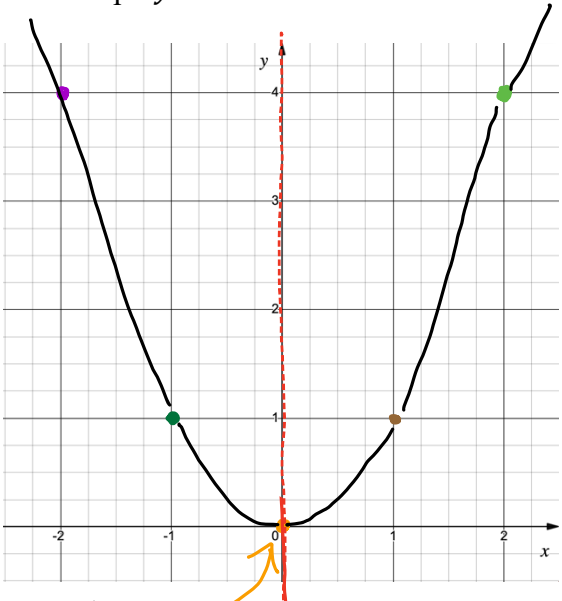
3. Parabola: A curve formed by a point moving so that its distance from a fixed point (which is called focus) is equal to its distance from a fixed line (which is called directrix).




4. The vertex and symmetric axis of parabola:

| $x$ | $y$ |
|---|---|
| -3 | 9 |
| -2 | 4 |
| -1 | 1 |
| 0 | 0 |
| 1 | 1 |
| 2 | 4 |
| 3 | 9 |

Graph $y=x^2$.

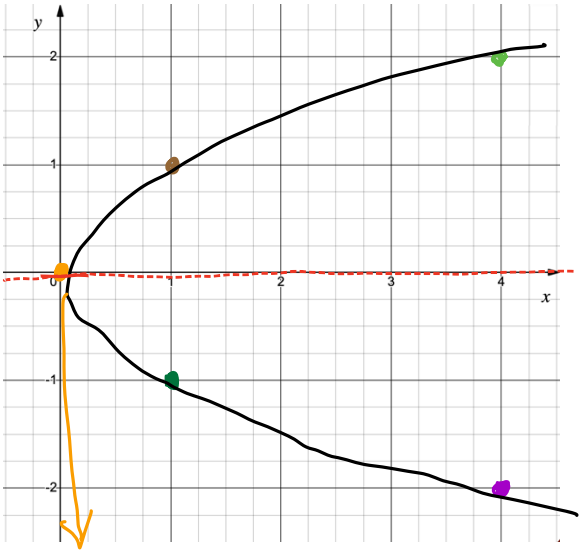



Vertex: ( 0 , 0 )

Symmetric axis: line $x=0$ (y-axis)

| $x$ | $y$ |
|---|---|
| 9 | -3 |
| 4 | -2 |
| 1 | -1 |
| 0 | 0 |
| 1 | 1 |
| 4 | 2 |
| 9 | 3 |

Graph $x=y^2$.




Vertex: ( 0 , 0 )

Symmetric axis: line $y=0$ (x-axis)

5. (Mirror of graph)Compare the graph of $y = -x^2$ with the graph of $y = x^2$. What do you see?

The graph of $y=-x^2$ is open down and $y=x^2$ is open up. they are symmetrical with respect to x-axis.

6. (Shifting of graph)Compare the graph of $y = (x + 1)^2$ with the graph of $y = x^2$. What do you see?

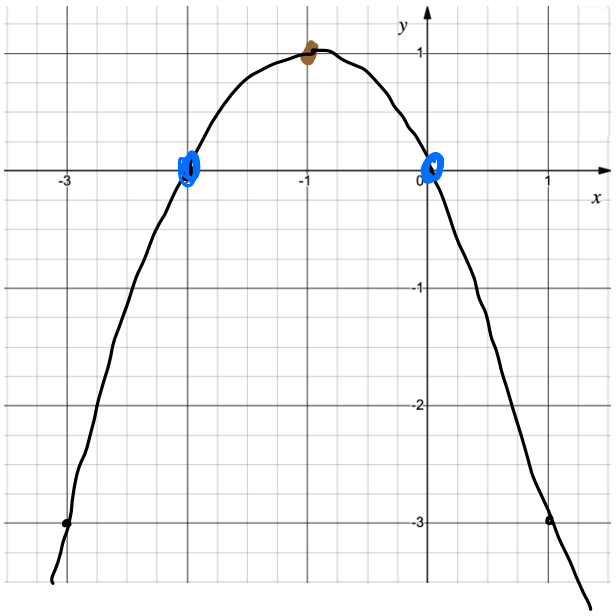
Vertex $(-1, 0)$ Vertex $(0, 0)$

Symmetrical axis $x=-1$ $x=0$

7. (Shifting of graph)Compare the graph of $y - 1 = (x + 1)^2$ with the graph of $y = x^2$. What do you see?

Vertex $(-1, 1)$

Symmetrical axis $x=-1$.




8. Graph $x^2 + 2x + y = 0$.

Complete the square

$x^2+2x+1+y=0+1$

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

$-(x+1)^2 \quad -(x+1)^2$

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

$-1 \quad -1$

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

$x^2+2x+c$

$x^2+2ax+a^2$

$2a=2 \Rightarrow a=1$

$c=a^2=1$

Vertex $x+1=0 \Rightarrow x=-1$

$(-1, 1)$

$y$-intercept $y+1=0 \Rightarrow y=-1$

$(-2, 0)$ and $(0, 0)$

9. (Mirror of graph)Compare the graph of $x = -y^2$ with the graph of $x = y^2$. What do you see?

The graph of $x=-y^2$ is open to the left, but the graph of $x=y^2$ is open to the right.

10. (Shifting of graph)Compare the graph of $x - 1 = (y + 2)^2$ with the graph of $x = y^2$. What do you see?

The graph of $x-1=(y+2)^2$ (with vertex $(1, -2)$) is the graph $x=y^2$ move to the right 1 unit and move down 2 units.

11. Graph $y^2 + 4y + x + 3 = 0$.

Complete the square

$y^2+4y+4+x+3=0+4$

$(y+2)^2+x+3=4$

$-(y+2)^2-4 \quad -4-(y+2)^2$

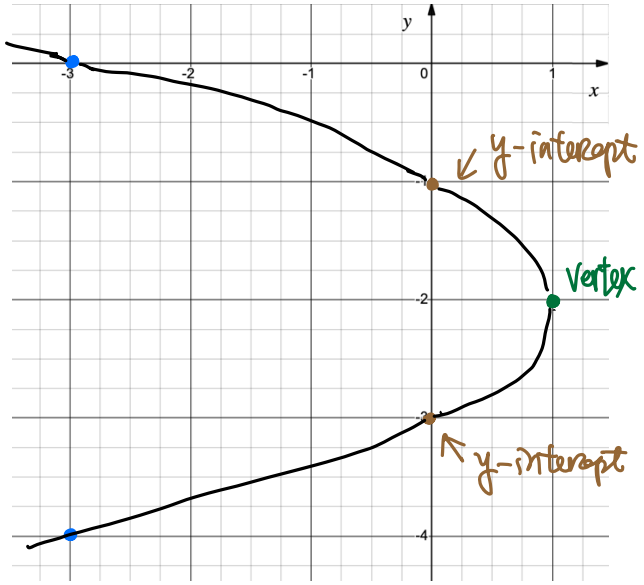
$x-1=-(y+2)^2$

Vertex $(1, -2)$ $y+2=0 \Rightarrow y=-2$

$x-1=0 \Rightarrow x=1$

$y$-intercept

(where $x=0$) $\Rightarrow (0, -1)$ or $(0, -3)$




$y^2+4y+0+3=0 \Rightarrow y^2+4y+3=0 \Rightarrow (y+1)(y+3)>0$

$y \quad y \quad +1 \quad +3$

$y=-1$ or $y=-3$