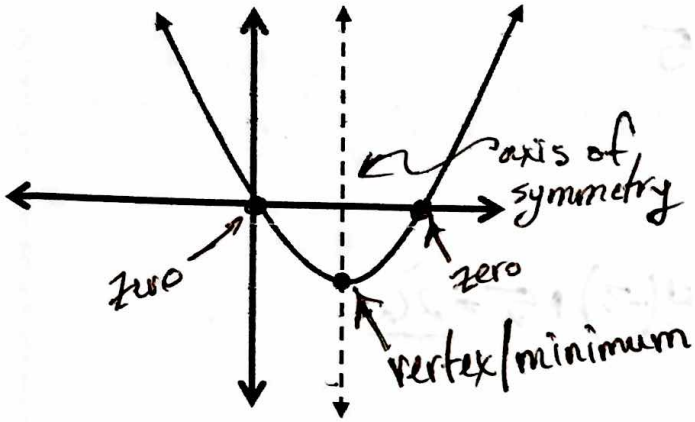
Notes 1st

NOTES: Graphing Quadratic Functions

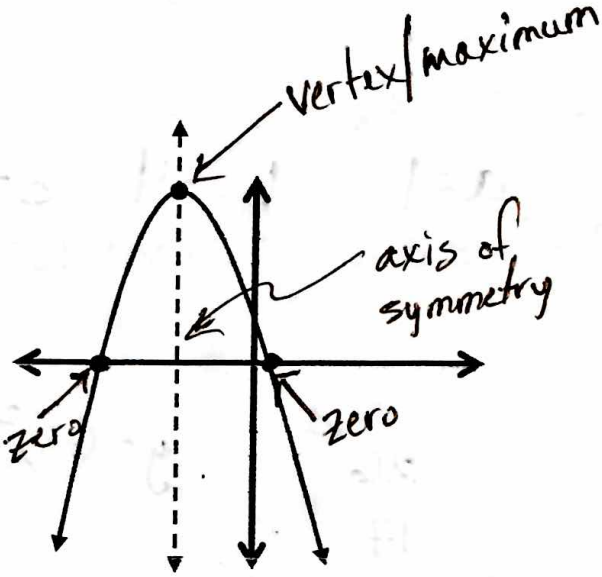
Quadratic Function: $y = ax^2 + bx + c$

General Form

The graph is a **parabola**.



opens up



opens down

- On a parabola that opens up, the lowest/min point is the **vertex**. On a parabola that opens down, the highest/max point is the **vertex**.
- The vertical line passing through the vertex is the **axis of symmetry**. This splits the parabola into two equal halves.
- If the graph ~~is going~~ opens up, then it has a minimum point.
- If the graph ~~is going~~ opens down, then it has a maximum point.
- A zero is a solution of the equation.
  All these mean the same:
  - Zeros
  - roots
  - x-intercepts (#, 0)
  - "values of x"
  - solutions

For each equation a) create a table of values
b) graph the quadratic
c) find the vertex
d) find the axis of symmetry

1. $y = x^2 - 4x + 5$

$a=1 \quad b=-4 \quad c=5$

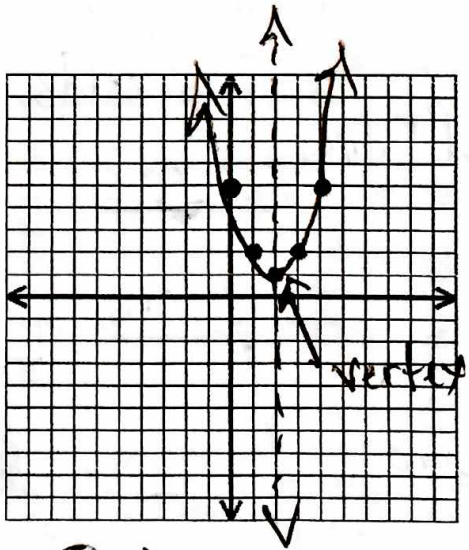
a) Create a table of values for the given "x" values:

x	y
-3	26
-2	17
-1	10
0	5
1	2
2	1
3	2
4	5

$y=(-3)^2-4(-3)+5=26$

graph

b) Graph the quadratic



c) Find the vertex

Vertex = (2, 1) minimum

d) Find the axis of symmetry: $x = \frac{-b}{2a} = \frac{-(-4)}{2(1)} = \frac{4}{2} = 2$

$x = 2$

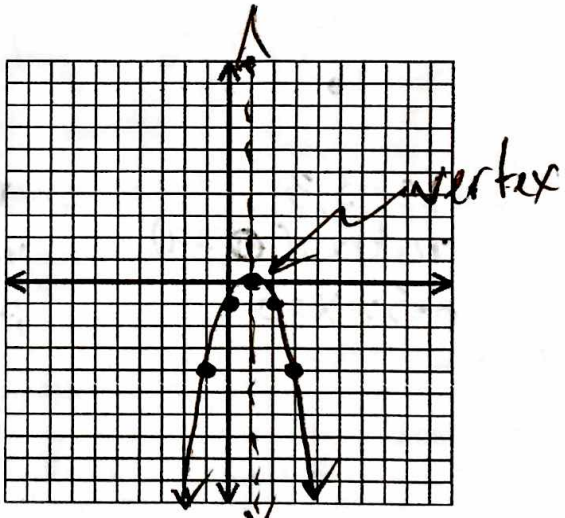
2. $y = -x^2 + 2x - 1$

a) Create a table of values for the given "x" values:

x	y
-3	-16
-2	-9
-1	-4
0	-1
1	0
2	-1
3	-4

graph

b) Graph the quadratic



c) Find the vertex

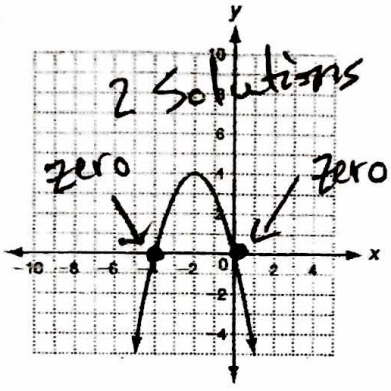
Vertex = (1, 0) maximum

d) Find the axis of symmetry: $x = \frac{-b}{2a}$

x = 1

Find the zeros of each quadratic function from its graph.

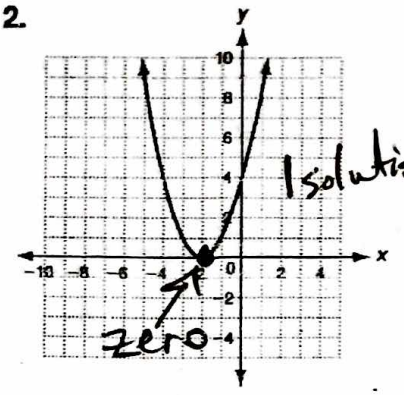
1.



$x = -4, 0$

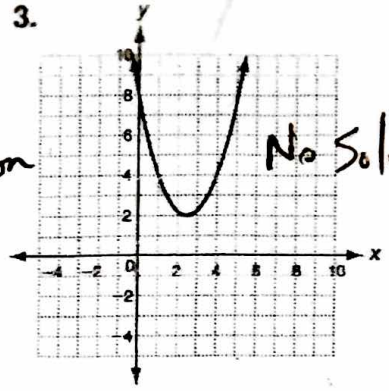
$(-4,0), (0,0)$

2.



$x = -2$

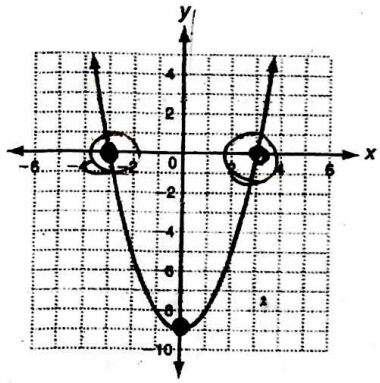
3.



None

Find the axis of symmetry of each parabola.

4.

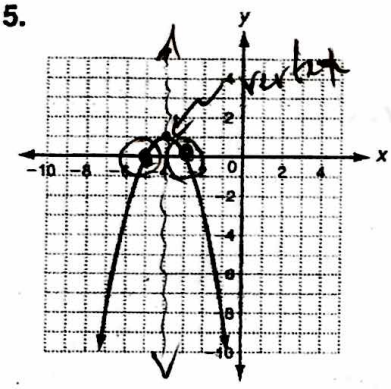


$x = -3, 3$

vertex: $(0, -9)$

AoS: $x = 0$

5.

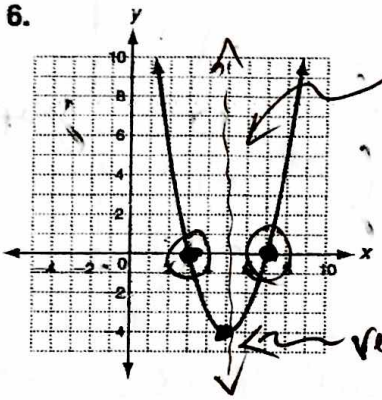


$x = -5, -3$

vertex: $(-4, 1)$

AoS: $x = -4$

6.



$x = 3, 7$

vertex: $(5, -4)$

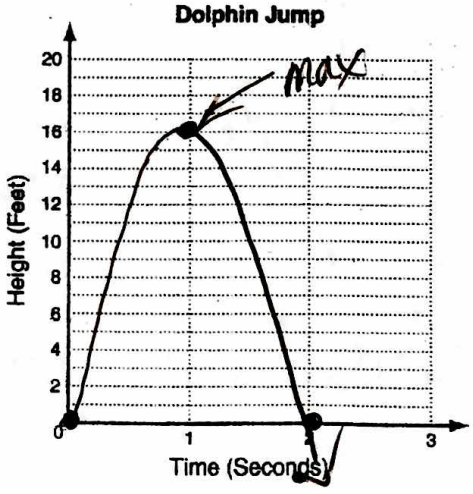
AoS: $x = 5$

7. The height in feet of a dolphin as it jumps out of the water at an aquarium show can be modeled by the function $f(x) = -16x^2 + 32x$, where x is the time in seconds after it exits the water. Find the dolphin's maximum height and the time it takes to reach this height. Then find how long the dolphin is in the air.

maximum height: 16 ft

time to reach maximum height: 1 sec

time in the air: 2 sec



x	y
0	0
1	16
2	0
3	-48