

3. (14 points) For each of the following quadratic functions:

- (i) Evaluate the discriminant.
- (ii) Use the discriminant to determine the number of horizontal intercepts for the function.
- (iii) Find all the zeros of the function.

a.  $f(x) = -x^2 - 3x - 4$

$\sqrt{b^2 - 4ac}$

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

$\sqrt{-7} = \sqrt{7} \sqrt{-1}$

$= 7i$

5

b.  $g(x) = (x+2)(x-4) + 9$

$x^2 - 4x + 2x - 8 + 9$

$x^2 - 2x + 1$

$\sqrt{b^2 - 4ac}$

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

7

no solution

4. (10 points) Given the quadratic function

$f(x) = -4(x+3)^2 + 2$

- a. Identify the vertex and axis of symmetry of the graph. Does the vertex represent a maximum or minimum of the function? Explain how you are concluding your answer.

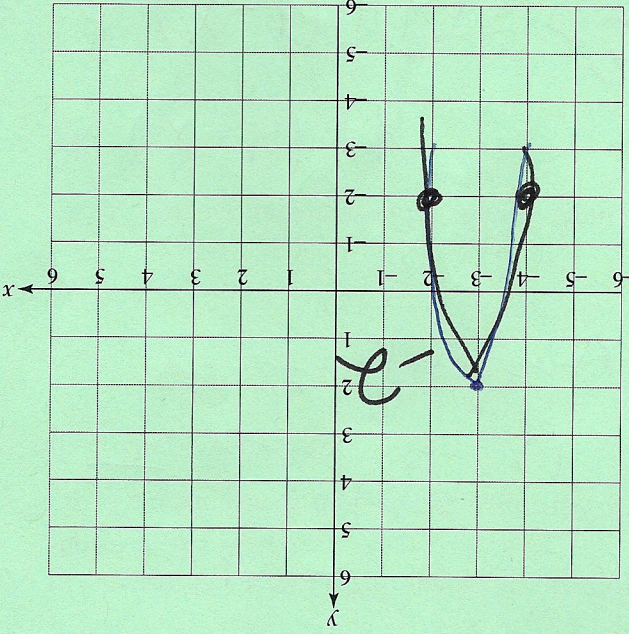
The vertex =  $(-3, 2)$

The axis is  $x = -3$

The vertex represent a maximum point

because  $a$  is negative therefore it is a concave

down, therefore vertex is maximum



$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = 0$$

$$\frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(1)}}{2(1)} = 0$$

$$\frac{2 \pm \sqrt{0}}{2} = 0$$

$$\frac{2}{2} = 0$$

$$1 = 0$$

$(-\frac{7}{2}, 0)$