

4.6-4.10 Practice test

- 1) Find the discriminant of the following quadratic:

$$3x^2 - 5x + 2$$

What does this value tell you about the type of solutions you would find?

$$b^2 - 4ac$$

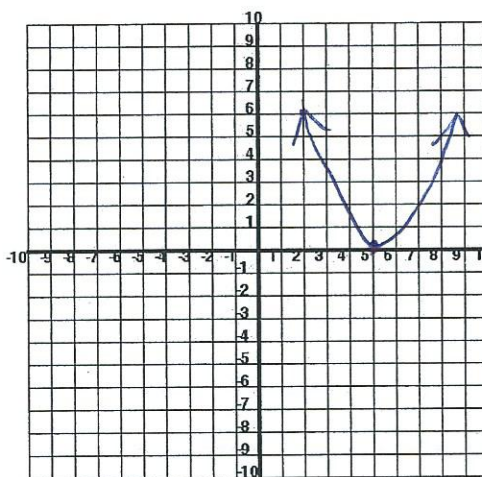
$$(-5)^2 - 4(3)(2) = 1$$

two real answers

two x-ints

- 2) Graph a quadratic where the discriminant of  $ax^2 + bx + c = 0$ , would be exactly 0.

Vertex  
is on  
x-axis



- 3) (calc) Solve the following equation for x:

$$a) \quad \begin{array}{r} 7x - 3x^2 = 85 + 2x^2 + 2x \\ -7x + 3x^2 \quad -3x^2 - 7x \end{array}$$

$$0 = 5x^2 - 5x + 85$$

$$5(x^2 - x + 17)$$

$$\frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(17)}}{2(1)}$$

$$\frac{1 \pm \sqrt{-68}}{2} = \frac{1 \pm 2\sqrt{17}i}{2}$$

$$= \boxed{\frac{1}{2} \pm \sqrt{17}i}$$

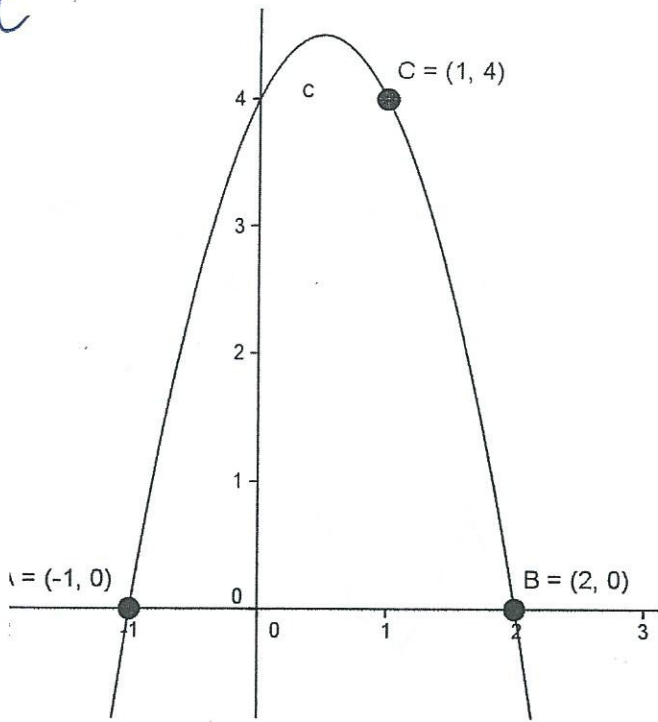
- 4) Write the expression as a complex number in **Standard Form**.

$$\frac{(2-3i)(4+2i)}{(4-2i)(4+2i)} = \frac{8 + 4i - 12i - 6i^2}{16 + 8i - 8i - 4i^2} = \frac{8 - 8i + 6}{16 - 4i^2} = \frac{14 - 8i}{20} = \frac{14}{20} - \frac{8}{20}i$$

$$= \boxed{\frac{7}{10} - \frac{2}{5}i}$$

5) Write a quadratic function for the graph given below.

NC

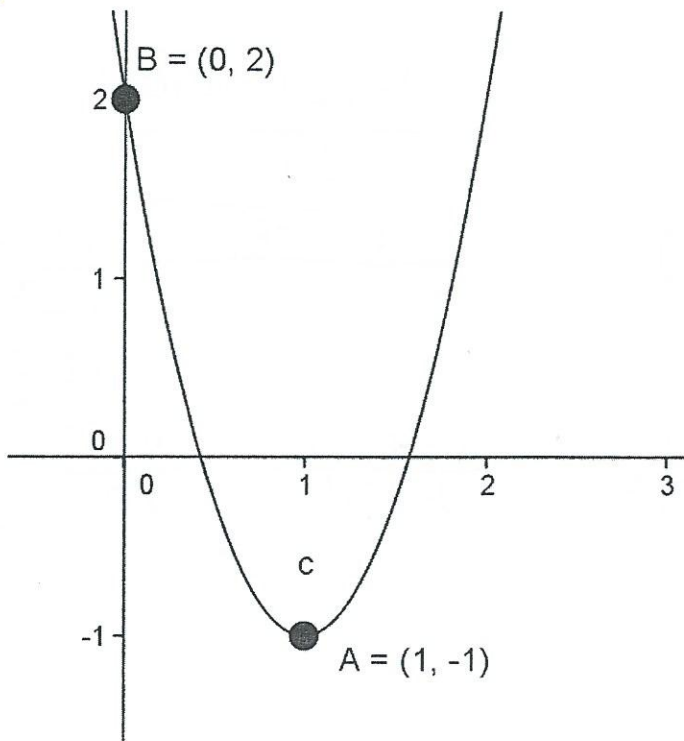


$$y = a(x-p)(x-q)$$
$$4 = a(1-(-1))(1-2)$$
$$4 = a(2)(-1)$$
$$4 = \frac{a(-2)}{-2}$$
$$-2 = a$$

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

6) Write a quadratic function for the graph given below.

NC



$$y = a(x-h)^2 + k$$
$$2 = a(0-1)^2 - 1$$
$$2 = a(1) - 1$$
$$+1 \quad +1$$
$$3 = a$$

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

- 7) Find the zeros of the following quadratic equation and write any answers in standard form of a complex number.

$$f(x) = (x-3)^2 - 12$$

$$0 = (x-3)^2 - 12$$

$$\begin{aligned} +12 & \quad +12 \\ \sqrt{12} & = \sqrt{(x-3)^2} \\ \pm\sqrt{12} & = x-3 \end{aligned}$$

$$\pm 2\sqrt{3} = x-3$$

$$x = 3 \pm 2\sqrt{3}$$

- 8) (Calc) Find the zeros of the following quadratic equation and write any answer in standard form of a complex number.

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

~~(A31)~~

$$\frac{-(3) \pm \sqrt{(3)^2 - 4(-6)(-1)}}{2(-6)}$$

$$\frac{-3 \pm \sqrt{-15}}{-12}$$

$$= \frac{-3}{-12} \pm \frac{\sqrt{15}i}{12}$$

$$\frac{1}{4} \pm \frac{\sqrt{15}}{12}i$$

- 9) Write the following expressions as a complex number in standard form.

a.  $(3 + 2i) - (7 - 4i)$

b.  $(2 - i)(3 + 3i)$

- 10) What is the complex conjugate to the complex number  $(6 - 4i)$ ?

What happens when you multiply a complex number with its complex conjugate?

$(6 + 4i)$  you will get a real number as the product

- 11) (Calc) The following table shows the population of a town from 1996 to 2004. Assume that  $T$  is the number of years since 1996 and  $P$  is measured in thousands of people.

$T$	0	1	2	3	4	5	6	7	8
$P$	22.8	25.0	26.5	27.1	27.8	28.1	27.9	26.9	26.1

- a. Use a graphing calculator to find the best fitting quadratic model for the data.

$$-.21x^2 + 2.08x + 22.96$$

- b. Use the model to predict what the population of the town will be in 2007.

20.43 thousand people

or

20,430 people

12) (Calc) At a track and field event a shot putter had a throw that is modeled by the function  $y = -0.04x^2 + 2x + 5$ , where  $x$  is the shot put's horizontal distance (in feet) and  $y$  is the height from the ground in feet. (Round answers to hundredths place)

a) What was the height of the shot put when it was released?

5 ft

b) What was the highest point from the ground that the shot put reached?

(25, 30) Vertex

$$h = \frac{-b}{2a} \quad \frac{-2}{2(-.04)} = 25$$

$$y = -0.04(25)^2 + 2(25) + 5$$

$$y = 30 \text{ ft}$$

c) How far did the throw travel horizontally? If they needed a 60 foot throw to be in first place, did they throw it far enough? Find the zeros

$$0 = -0.04x^2 + 2x + 5$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-2 \pm \sqrt{4 - 4(-.04)(5)}}{2(-.04)}$$

Find the zeros

$$x = -2.39 \text{ ft}$$

$$x = 52.39 \text{ ft}$$

$$0 = -0.04(x-25)^2 + 30$$

use square roots

13) Find the axis of symmetry, zeros, and vertex of the following quadratic functions.

a)  $y = x^2 + 6x + 10$

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

Vertex  
(-3, 1)

Axis of sym  $x = -3$

$$(-3)^2 + 6(-3) + 10$$

$$9 - 18 + 10 = 1$$

$$0 = x^2 + 6x + 10$$

quadratic formula

$$\text{zeros}$$

$$x = -3 \pm \sqrt{6}$$

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

square roots

b)  $y = -2x^2 - 12x - 12$

$$x = \frac{-(-12)}{2(-2)}$$

$$y = -2(-3)^2 - 12(-3) - 12$$

$$\frac{12}{-4} = -3$$

$$y = 6$$

$$x = -3 \quad (-3, 6)$$

$$\text{zeros}$$

$$-3 \pm \sqrt{3}$$