Dr. Katiraie Math 115A Notes for Section 3-4 Quadratics and Parabolas

The general form for solving quadratic equations is

$ax^2 + bx + c = 0$

Easy type factoring example:

Solutions x = _____ x = _____

Another way to obtain the solution for Quadratics is the quadratic formula

Formula:

Ex. Solve $x^2 - 3x - 2 = 0$

a = 1 b =_____ c = _____

Exact Solutions x = _____ x = _____

Approximate solutions x = _____ x = _____

Now you try.

Solve by facoring

1. **$x^2+4x -5 = 0$**

2. **$x^2+ 6x -27 = 0$**

Solve by using the quadratic formula

3. **$x^2 +2x -2 = 0$**

4. $x^2 + x - 1 = 0$

I. Example of using the Quadratic Formula in real life: Throwing a Rock

If a rock is thrown downward with an initial speed of 32 feet per second, the distance D, in feet , that the rock travels in t seconds is given by

$$D = 16t^2 + 32t$$

Ex. If the rock is thrown from the top of a tower that is 128 feet tall, how long does it take for the rock to hit the ground?

Using the formula above we get

Then we set the equation to zero so that we can factor this equation.

Its easier to factor if we divide every term by 16. Then we obtain.

Solving this we obtain t = _____ and t = _____

The answer is _____

Now you try using this formula to throw a rock from a 48 feet tower, how long does it take for the rock to hit the ground?

t= _____

II. Example using the Quadratic Formula for stable population levels.
For a certain population the growth rate G, in thousands of individuals per year depends on the size N, in thousands, of the population. The relation is

$$G = 1 + N - .2\,N^2$$

-the population level is stable so the growth rate is 0. At what level is the population stable?

a = _____ b = _____ c = _____

Solution N = _____ N = _____
But the solution is _____ because _____

You try to find the level at which the population is stable using

$G = 2 + 2N - .3N^2$

Dr. Katiraie-Math 115A Part 2 Section3.4 Parabolas Notes

Quadratics have the shape of a _____

i. opens upward

Formula_____ Vertex--_____ point when parabola opens upward.

ii. opens downward

Formula_____ Vertex--- _____ point when parabola opens downward.

Vertex Formula (,)

x value y value

Example one—Find the vertex of $y = 3x^2 - 24x + 10$

****Now you try to find the vertex of $y = 2x^2 - 28x + 12$**

Example using vertex—A rectangular pen can be constructed using the side of a barn as one boundary and 100 ft. of fence to make the other three sides. Find the length and width of the rectangle to make the largest area.

Draw a picture-

Work to solve problem.

x = width = _____ y = length= 100 – 2x = _____

****Now you try the same problem but using 200 feet for fencing.**