MAT 135 – Business Precalculus

Chapter R.5

Quadratic Inequality

Solve a quadratic inequality of one variable by graphing.

Ex: $x^2 - x < 12$

1) Put in standard form

$$x^2 - x - 12 < 0$$

2) Change inequality to an equation.

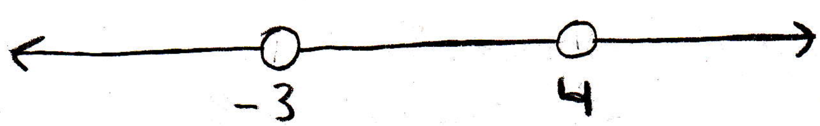
$$x^2 - x - 12 = 0$$

3) Factor and solve for x.

$$(x-4)(x+3) = 0$$

$$x = 4 \quad \text{or} \quad x = -3$$

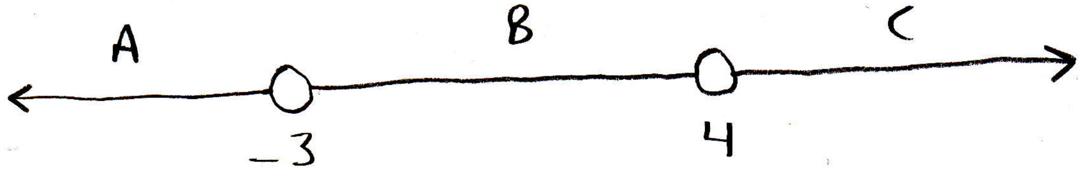
4) Put x solutions on a number line.



Since this is a strict inequality $<$, use open circle at the x points.

cont.

5) Intervals will be created on the number line. There will be one more interval than the number of x solutions. Label the intervals A, B, C, etc.



6) Substitute numbers that fall in intervals and solve the inequality in standard form.

<u>Interval A:</u> choose -4

$$(-4)^2 - (-4) - 12 = 8$$

Left side equals 8 so the entire inequality is $8 < 0$, so False

<u>Interval B:</u> choose 0

$$0^2 - 0 - 12 = -12$$

Left side equals -12 so the entire inequality is $-12 < 0$, so True

<u>Interval C:</u> choose 5

$$5^2 - 5 - 12 = 8$$

Left side equals 8 so the entire inequality is $8 < 0$, so False

cont.

So for Step 6,

- If the inequality has a $<$ or $\leq$, determine which of the intervals make the left side '$-$' which is done when substituting.

  Then compare the inequality. If left side is '$-$', then we have

  '$-$' < 0, which is True.

  If True, shade that interval (and endpoints if $\leq$). This is part of the solution.

  If False, do not shade. this is not part of the solution.

- Alternatively, if the inequality has a $>$ or $\geq$, determine which of the intervals make the left side '$+$' when substituting.

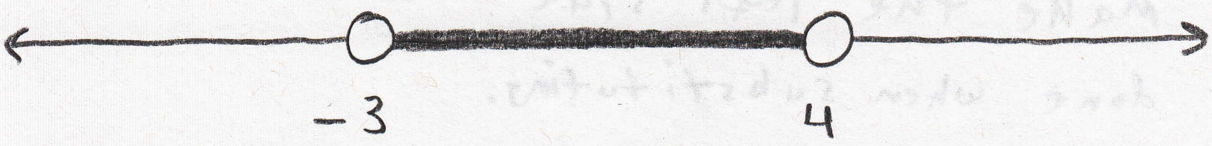
  Then compare the inequality. If left side is '$+$', then we have

  '$+$' > 0, which is True.

  Shade interval as described above.

cont. ↗

The solution looks like this:



The graphed form of the solution.