Section 2.5 Solving Polynomial Functions Using Tech.

- A polynomial inequality results when the equal sign in a polynomial equation is replaced with an inequality symbol. < >

  Less than Greater than

- The real zeros of a polynomial function, or x-intercepts of the corresponding graph, divide the x-axis into intervals that can be used to solve a polynomial inequality.

- Polynomial inequalities may be solved graphically by determining the x-intercepts and then using the graph to determine the intervals that satisfy the inequality.

- A CAS (computer algebra system) on a graphing calculator may be used to solve a polynomial inequality numerically by determining the roots of the polynomial equation and then testing values in each interval to see if they make the inequality true.

Examine the graph of $f(x) = x^2 + 4x - 12$

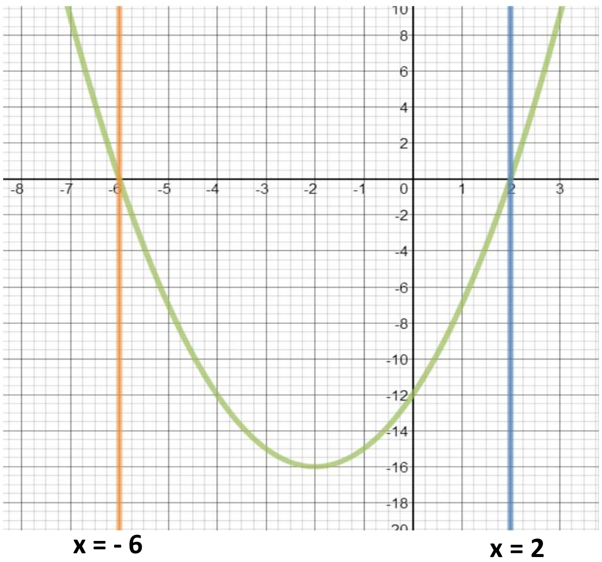
The x-intercepts are -6 and 2. These correspond to the zeros of the function $f(x) = x^2 + 4x - 12$

By moving from left to right along the x-axis, we can make the following observations.

- The function is positive when $x < -6$ since the y-values are positive

- The function is negative when $-6 < x < 2$ since the y-values are negative.

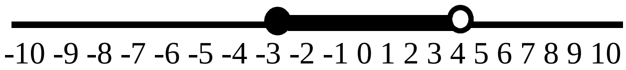
- The function is positive when $x > 2$ since the y-values are positive

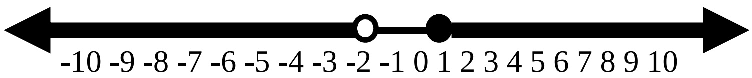


The zeros -6 and 2 divide the x-axis into three intervals: $x < -6$, $-6 < x < 2$ and $x > 2$. In each interval, the function is either positive or negative. The information can be summarized in a table, as shown below.

Interval	$x < -6$	$-6 < x < 2$	$x > 2$
Sign of Function	+	●	+

Examples: Write inequalities for the values of x shown.

a) 

b) 

Example: Write intervals into which the x-axis is divided by each set of x-intercepts of a polynomial function.

a) -1/2 , 5

b) - 4, 0, 1

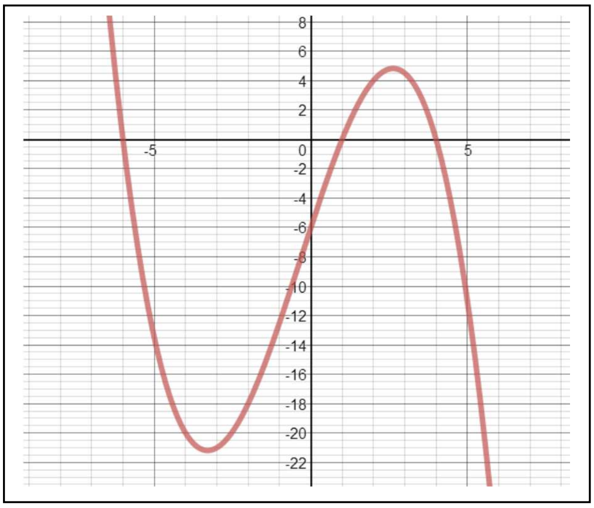
Example: Sketch a graph of a cubic polynomial function $y = f(x)$ such that

$f(x) < 0$ when $x < -3$ *or* $-1 < x < 5$, and
$f(x) > 0$ when $-3 < x < -1$ *or* $x > 5$.

Example: For the following graphs, write the

i) x-intercepts
ii) intervals of x for which the graph is positive
iii) intervals of x for which the graph is negative

a)



b)