Name: _____   Date: _____

Learning Goal 3.3	Solving equations algebraically and graphically.

Example Consider the function $f(x) = -x^3 - 5x^2 - 3x + 9$ and without the use of technology, determine the following attributes.

$$= -(x^3 + 5x^2 + 3x - 9)$$

Degree	Leading Coefficient	y – intercept value	x – intercept value(s)
THREE	-1	$y = 9$ $(0, 9)$	btwn 1-3 $x = -3, 1$ $(-3, 0)$ $(1, 0)$

Interval(s) where the function is positive	Interval(s) where the function is negative
$\{x \mid x < 1, x \in \mathbb{R}\}$	$\{x \mid x > 1, x \in \mathbb{R}\}$

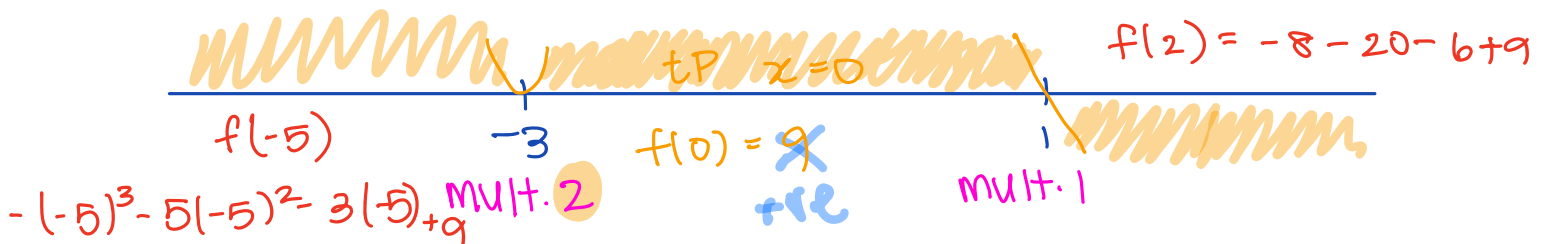Factor: $\pm 1, \pm 3, \pm 9$

$f(3) = -(3)^3 - 5(3)^2 - 3(3) + 9$
$= -27 - 45 - 9 + 9$

$f(-3) = -(-3)^3 - 5(-3)^2 - 3(-3) + 9$
$= 27 - 45 + 9 + 9 = 0$

$$
\begin{array}{c|cccc}
-3 & -1 & -5 & -3 & 9 \\
   &   & 3 & 6 & -9 \\
\hline
   & -1 & -2 & 3 & 0
\end{array}
$$

$-x^3 - 5x^2 - 3x + 9 = (x+3)(-x^2 - 2x + 3)$
$\qquad = -(x+3)(x^2 + 2x - 3)$
$\qquad = -(x+3)(x+3)(x-1)$
$\qquad = -(x+3)^2(x-1)$

$f(2) = -8 - 20 - 6 + 9$

$f(-5)$ -3 mult. 2 $f(0) = 9$ +ve   mult. 1

tP $x = 0$

$-(-5)^3 - 5(-5)^2 - 3(-5) + 9$
$= 125 - 125 + 15 + 9$

Assignment   p. 147 # 3 – 6, 8, 10, 11, 20, 22   Quiz Next Day!

Use the information from the previous page to **sketch** the graph.
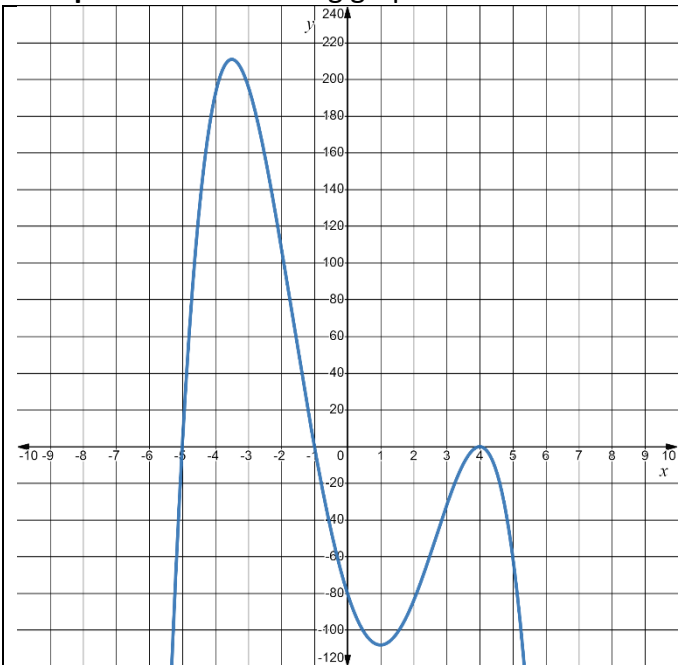
GUESS

from equation
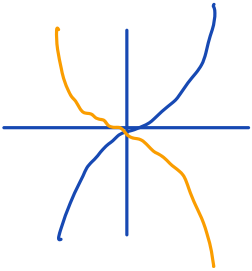
from factoring
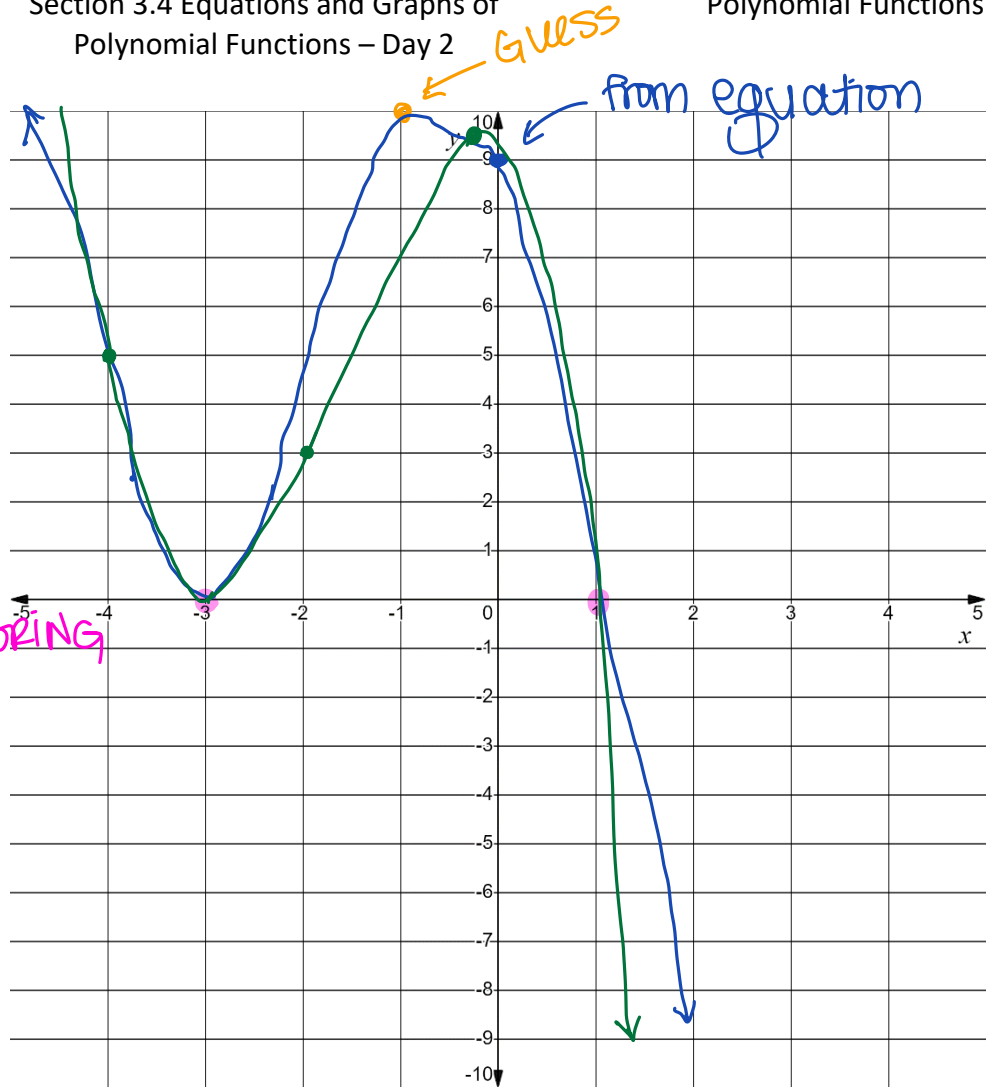
Use technology to draw the graph.

Example For the following graph fill out the tables.

Least possible degree
four - could be more.   - count the zeros   - count the bumps
Sign of the leading coefficient
- ve
$x-$ intercepts and the factors of the function
$x = -5, -1, 4$ odd mult $(x+5)(x+1)(x-4)$ ← even multiplicity
Intervals where positive and negative
tve: $\{x \mid -5 < x < -1, x \in \mathbb{R}\}$ -ve: $\{x \mid x < -5, x > 1, x \in \mathbb{R}\}$

Assignment   p. 147 # 3 – 6, 8, 10, 11, 20, 22   Quiz Next Day!