For each polynomial, complete the following:
    (a) Use the Leading Coefficient Test to describe the end behavior.
    (b) Use your graphing calculator to locate one of the zeros. Then, find all remaining Zeros. All non-
        integer zeros must be written as improper fractions. You must show all work & checks for these!
    (c) Write the polynomial in factored form.
    (d) Sketch the graph of the polynomial. (You must include the y-intercept, all zeros, any relative
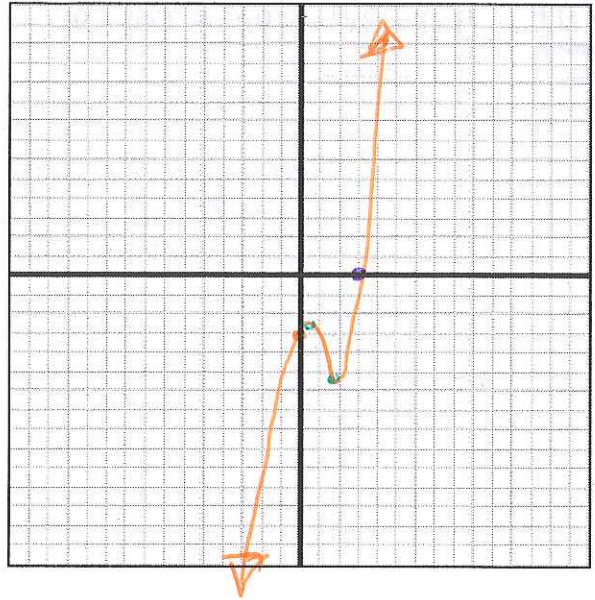   minima/maxima, and the basic shape using the Leading Coefficient Test).

5.) $f(x) = x^3 - 3x^2 + x - 3$

$$3 \,|\!\underline{\begin{array}{cccc} 1 & -3 & 1 & -3 \\ & 3 & 0 & 3 \\ \hline 1 & 0 & 1 & 0 \end{array}}$$

$$x^2 + 1 = 0$$
$$x^2 = -1$$
$$x = \pm i$$

(a) Describe End Behavior: As $x \to \infty$, $f(x) \to \infty$. And as $x \to -\infty$, $f(x) \to -\infty$

(b) Zeros: $x = 3, \pm i$ (c) Product of Linear Factors: $(x-3)(x^2+1)$

(d) Relative Minima/Maxima: $(.18, -2.9)(1.8, -5.1)$
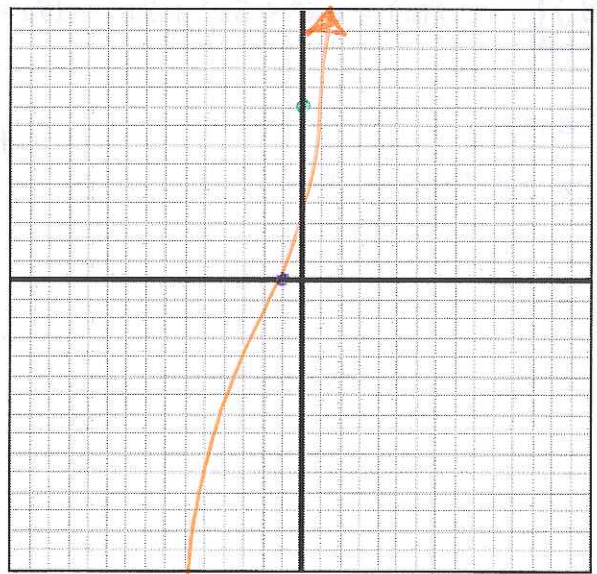
6.) $f(x) = x^3 + x^2 + 9x + 9$

Calc
-1

$$-1 \,|\!\underline{\begin{array}{cccc} 1 & 1 & 9 & 9 \\ & -1 & 0 & -9 \\ \hline 1 & 0 & 9 & 0 \end{array}}$$

$$x^2 + 9 = 0$$
$$x^2 = -9$$
$$x = \pm 3i$$

(a) Describe End Behavior: As $x \to \infty$, $f(x) \to \infty$. And as $x \to -\infty$, $f(x) \to -\infty$.

(b) Zeros: $x = -1, \pm 3i$ (c) Product of Linear Factors: $(x+1)(x^2+9)$

(d) Relative Minima/Maxima: none

For each polynomial, complete the following:
   (a) Use the Leading Coefficient Test to describe the end behavior.
   (b) Use your graphing calculator to locate one of the zeros. Then, find all remaining Zeros. All non-
        integer zeros must be written as improper fractions. You must show all work & checks for these!
   (c) Write the polynomial in factored form.
   (d) Sketch the graph of the polynomial. (You must include the y-intercept, all zeros, any relative
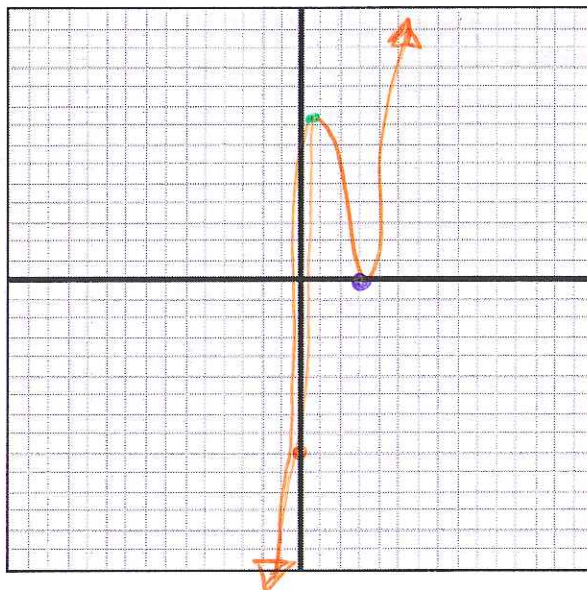   minima/maxima, and the basic shape using the Leading Coefficient Test).

7.) $f(x) = 3x^3 - 19x^2 + 33x - 9$

Calc

3 d.r.

$$
\begin{array}{c|cccc}
3 & 3 & -19 & 33 & -9 \\
  &   & 9 & -30 & 9 \\
\hline
\cdot 3 & 3 & -10 & 3 & 0 \\
  &   & 9 & -3 & \\
\hline
  & 3x & -1 & 0 &
\end{array}
$$

(a) Describe End Behavior: As $x \to \infty$, $\underline{f(x) \to \infty}$. And as $x \to -\infty$, $\underline{f(x) \to -\infty}$.

(b) Zeros: $\underline{X = 3\,d.r., \ ^1/_3}$ (c) Product of Linear Factors: $\underline{(3x-1)(x-3)^2}$

(d) Relative Minima/Maxima: $\underline{(1.2, 8.4)\ (3, 0)}$
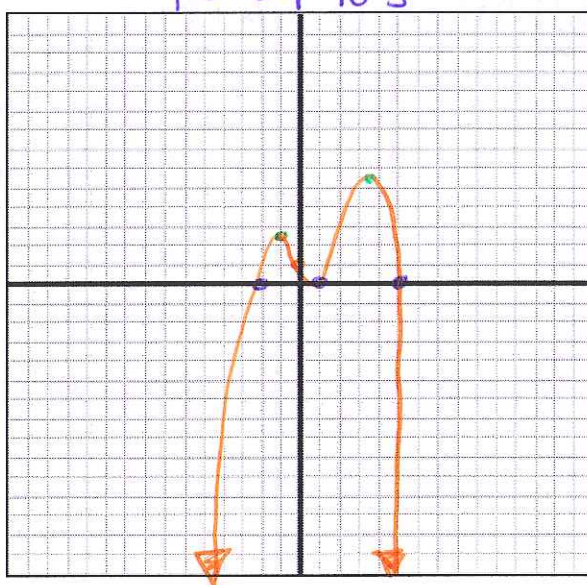
8.) $f(x) = -x^4 + 5x^3 + 3x^2 - 17x + 10$

y's by 10's

Calc

$-2, 1\,d.r., 5$

Note: you
should change
the scale on the
y-axis.

(a) Describe End Behavior: As $x \to \infty$, $\underline{f(x) \to -\infty}$. And as $x \to -\infty$, $\underline{f(x) \to -\infty}$.

(b) Zeros: $\underline{X = 1\,d.r., -2, 5}$ (c) Product of Linear Factors: $\underline{(x+2)(x-5)(x-1)^2}$

(d) Relative Minima/Maxima: $\underline{(-1, 24)\ (3.9, 54.6)\ (1, 0)}$