

**GRAPHING POLYNOMIAL FUNCTIONS**

Directions: Determine all properties of each polynomial function and sketch a graph WITHOUT a graphing calculator.

1.)  $f(x) = x^3 - 4x^2 - x + 4$

a.) Determine the possible number of rational roots.

Possible Roots: \_\_\_\_\_

b.) Determine the possible number of positive and negative real zeros.

# of possible positive zeros: \_\_\_\_\_

# of possible negative zeros: \_\_\_\_\_

c.) Determine the linear factorization and zeros. Be sure to state if any zeros have multiplicity.

FACTORS: \_\_\_\_\_

ZEROS: \_\_\_\_\_

d.) Determine the end behavior.

$x \rightarrow -\infty$        $f(x) \rightarrow$  \_\_\_\_\_

$x \rightarrow \infty$        $f(x) \rightarrow$  \_\_\_\_\_

e.) Determine the possible number of turning points.

Max # of turning points: \_\_\_\_\_

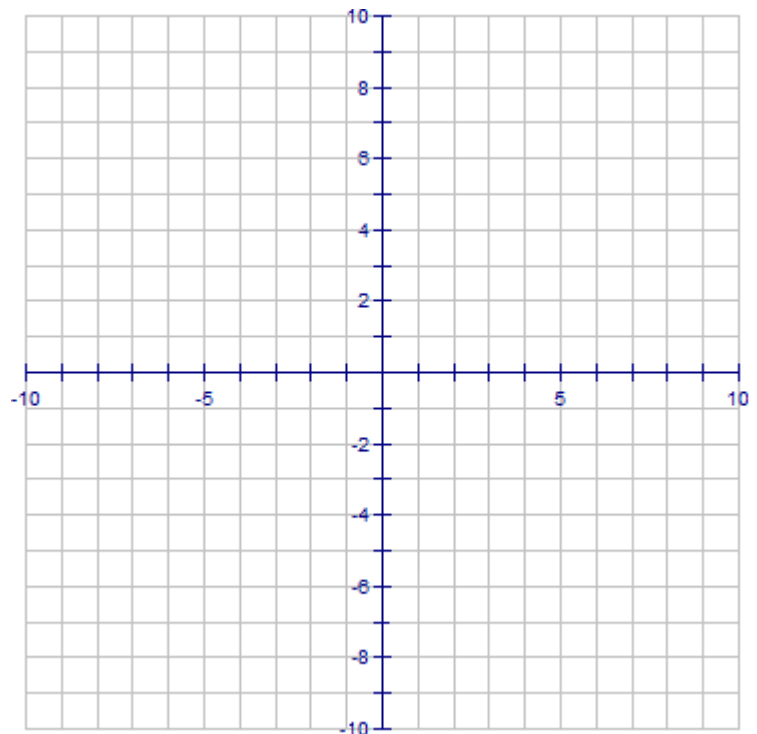
f.) Determine the  $x$ -intercept(s).

\_\_\_\_\_

g.) Determine the  $y$ -intercept. \_\_\_\_\_

GIVEN:      Maximum:       $(-0.12, 4.06)$

GIVEN:      Minimum:       $(2.78, -8.21)$



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

a.) Determine the possible number of rational roots.

Possible Roots: \_\_\_\_\_

b.) Determine the possible number of positive and negative real zeros.

# of possible positive zeros: \_\_\_\_\_

# of possible negative zeros: \_\_\_\_\_

c.) Determine the linear factorization and zeros. Be sure to state if any zeros have multiplicity.

FACTORS: \_\_\_\_\_

ZEROS: \_\_\_\_\_

d.) Determine the end behavior.

$x \rightarrow -\infty$        $f(x) \rightarrow$  \_\_\_\_\_

$x \rightarrow \infty$        $f(x) \rightarrow$  \_\_\_\_\_

e.) Determine the possible number of turning points.

Max # of turning points: \_\_\_\_\_

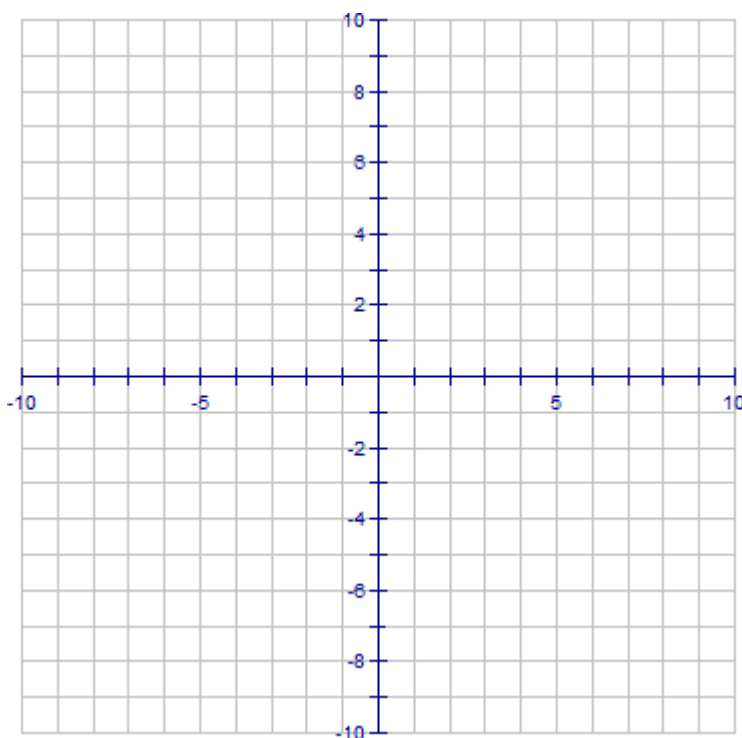
f.) Determine the  $x$ -intercept(s).

\_\_\_\_\_

g.) Determine the  $y$ -intercept. \_\_\_\_\_

GIVEN:      Maximum:      (0.18, -2.91)

GIVEN:      Minimum:      (1.81, -5.09)



3.)  $f(x) = 2x^3 - 13x^2 + 24x - 9$

a.) Determine the possible number of rational roots.

Possible Roots: \_\_\_\_\_

b.) Determine the possible number of positive and negative real zeros.

# of possible positive zeros: \_\_\_\_\_

# of possible negative zeros: \_\_\_\_\_

c.) Determine the linear factorization and zeros. Be sure to state if any zeros have multiplicity.

FACTORS: \_\_\_\_\_

ZEROS: \_\_\_\_\_

d.) Determine the end behavior.

$x \rightarrow -\infty$        $f(x) \rightarrow$  \_\_\_\_\_

$x \rightarrow \infty$        $f(x) \rightarrow$  \_\_\_\_\_

e.) Determine the possible number of turning points.

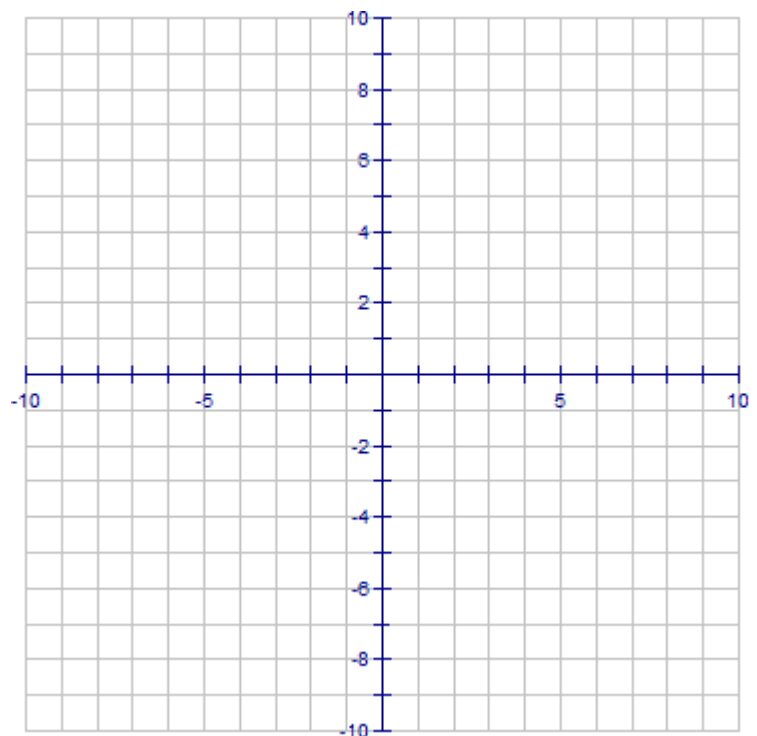
Max # of turning points: \_\_\_\_\_

f.) Determine the  $x$ -intercept(s).

\_\_\_\_\_

g.) Determine the  $y$ -intercept. \_\_\_\_\_

GIVEN:      Maximum:      (1.33, 4.63)



4.)  $f(x) = x^3 - 9x^2 + 20x - 12$

a.) Determine the possible number of rational roots.

Possible Roots: \_\_\_\_\_

b.) Determine the possible number of positive and negative real zeros.

# of possible positive zeros: \_\_\_\_\_

# of possible negative zeros: \_\_\_\_\_

c.) Determine the linear factorization and zeros. Be sure to state if any zeros have multiplicity.

FACTORS: \_\_\_\_\_

ZEROS: \_\_\_\_\_

d.) Determine the end behavior.

$x \rightarrow -\infty$        $f(x) \rightarrow$  \_\_\_\_\_

$x \rightarrow \infty$        $f(x) \rightarrow$  \_\_\_\_\_

e.) Determine the possible number of turning points.

Max # of turning points: \_\_\_\_\_

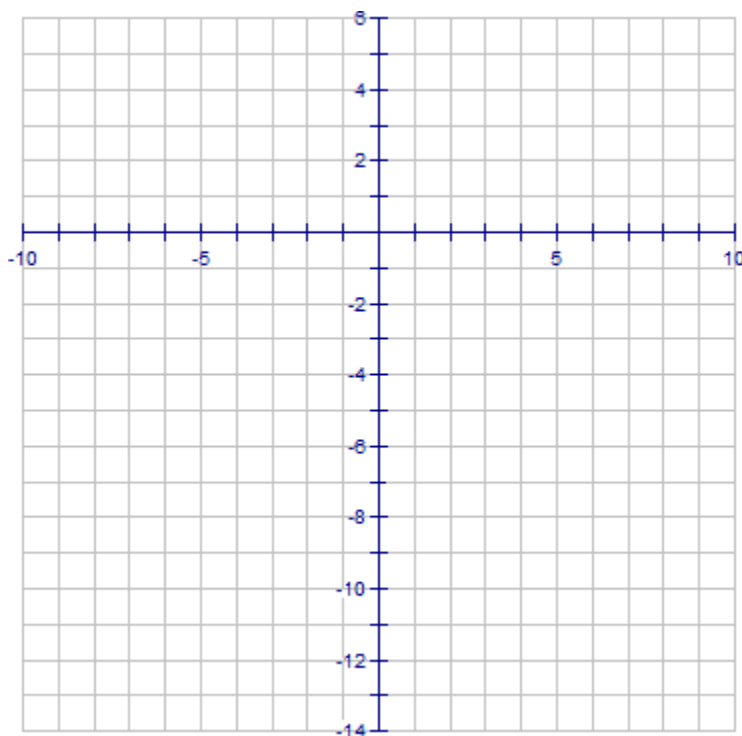
f.) Determine the  $x$ -intercept(s).

\_\_\_\_\_

g.) Determine the  $y$ -intercept. \_\_\_\_\_

GIVEN:      Maximum:      (1.47, 1.13)

GIVEN:      Minimum:      (4.53, -13.13)



5.)  $f(x) = x^4 - 3x^3 + 5x^2 - x - 10$

a.) Determine the possible number of rational roots.

Possible Roots: \_\_\_\_\_

b.) Determine the possible number of positive and negative real zeros.

# of possible positive zeros: \_\_\_\_\_

# of possible negative zeros: \_\_\_\_\_

c.) Determine the linear factorization and zeros. Be sure to state if any zeros have multiplicity.

FACTORS: \_\_\_\_\_

ZEROS: \_\_\_\_\_

d.) Determine the end behavior.

$x \rightarrow -\infty$        $f(x) \rightarrow$  \_\_\_\_\_

$x \rightarrow \infty$        $f(x) \rightarrow$  \_\_\_\_\_

e.) Determine the possible number of turning points.

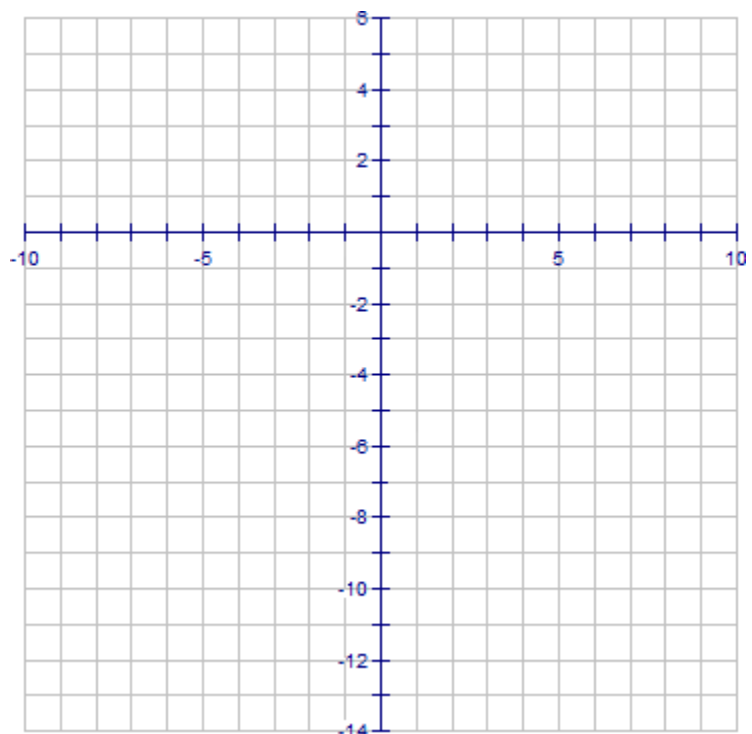
Max # of turning points: \_\_\_\_\_

f.) Determine the  $x$ -intercept(s).

\_\_\_\_\_

g.) Determine the  $y$ -intercept. \_\_\_\_\_

GIVEN:      Minimum:       $(0.11, -10.01)$



6.)  $f(x) = 4x^4 - 17x^2 + 4$

a.) Determine the possible number of rational roots.

Possible Roots: \_\_\_\_\_

b.) Determine the possible number of positive and negative real zeros.

# of possible positive zeros: \_\_\_\_\_

# of possible negative zeros: \_\_\_\_\_

c.) Determine the linear factorization and zeros. Be sure to state if any zeros have multiplicity.

FACTORS: \_\_\_\_\_

ZEROS: \_\_\_\_\_

d.) Determine the end behavior.

$x \rightarrow -\infty$        $f(x) \rightarrow$  \_\_\_\_\_

$x \rightarrow \infty$        $f(x) \rightarrow$  \_\_\_\_\_

e.) Determine the possible number of turning points.

Max # of turning points: \_\_\_\_\_

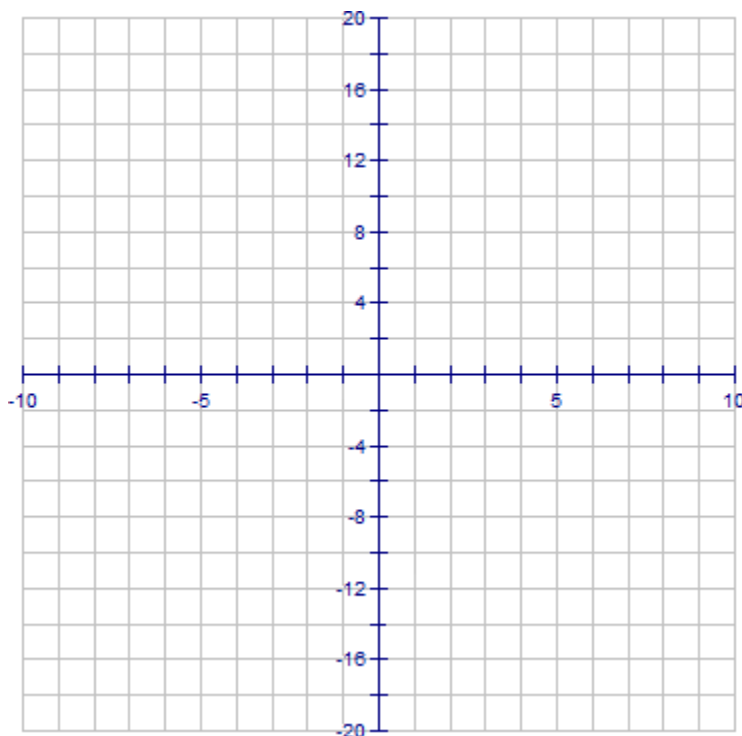
f.) Determine the  $x$ -intercept(s).

\_\_\_\_\_

g.) Determine the  $y$ -intercept. \_\_\_\_\_

GIVEN:      Maximum:  $(0, 4)$

GIVEN:      Minimum:  $(-1.46, -14.06)$  &  $(1.46, -14.06)$



7.)  $f(x) = 2x^4 + 5x^3 + 4x^2 + 5x + 2$

a.) Determine the possible number of rational roots.

Possible Roots: \_\_\_\_\_

b.) Determine the possible number of positive and negative real zeros.

# of possible positive zeros: \_\_\_\_\_

# of possible negative zeros: \_\_\_\_\_

c.) Determine the linear factorization and zeros. Be sure to state if any zeros have multiplicity.

FACTORS: \_\_\_\_\_

ZEROS: \_\_\_\_\_

d.) Determine the end behavior.

$x \rightarrow -\infty$        $f(x) \rightarrow$  \_\_\_\_\_

$x \rightarrow \infty$        $f(x) \rightarrow$  \_\_\_\_\_

e.) Determine the possible number of turning points.

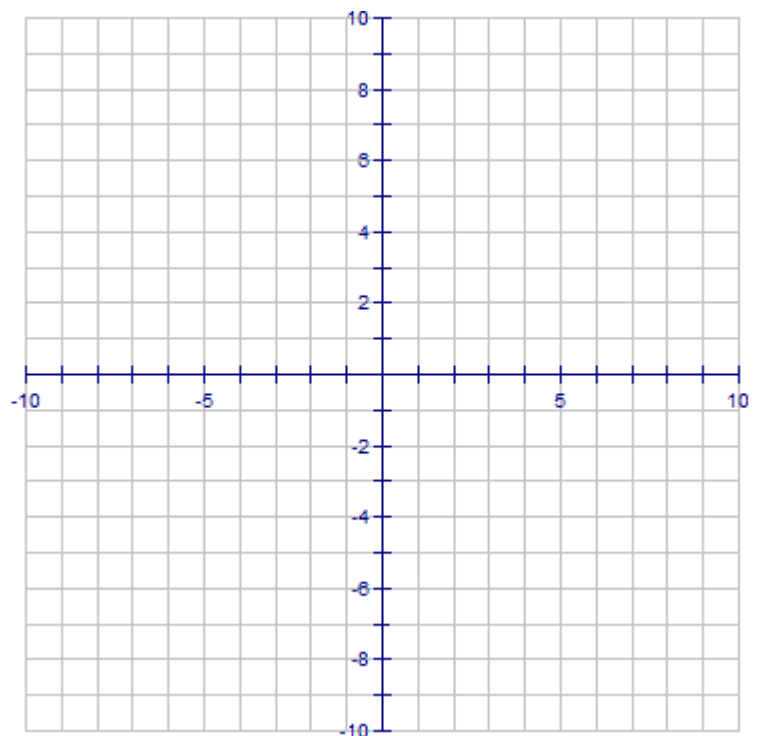
Max # of turning points: \_\_\_\_\_

f.) Determine the  $x$ -intercept(s).

\_\_\_\_\_

g.) Determine the  $y$ -intercept. \_\_\_\_\_

GIVEN:      Minimum:       $(-1.49, -3.25)$



8.)  $f(x) = x^5 - 2x^4 + 3x^3 - 6x^2 - 4x + 8$

a.) Determine the possible number of rational roots.

Possible Roots: \_\_\_\_\_

b.) Determine the possible number of positive and negative real zeros.

# of possible positive zeros: \_\_\_\_\_

# of possible negative zeros: \_\_\_\_\_

c.) Determine the linear factorization and zeros. Be sure to state if any zeros have multiplicity.

FACTORS: \_\_\_\_\_

ZEROS: \_\_\_\_\_

d.) Determine the end behavior.

$x \rightarrow -\infty$        $f(x) \rightarrow$  \_\_\_\_\_

$x \rightarrow \infty$        $f(x) \rightarrow$  \_\_\_\_\_

e.) Determine the possible number of turning points.

Max # of turning points: \_\_\_\_\_

f.) Determine the  $x$ -intercept(s).

\_\_\_\_\_

g.) Determine the  $y$ -intercept. \_\_\_\_\_

GIVEN:      Maximum:       $(-0.27, 8.57)$

GIVEN:      Minimum:       $(1.60, -4.09)$

