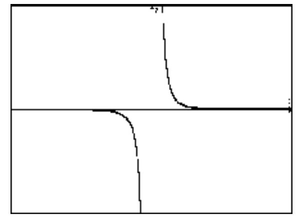
Polynomial Review For QUIZ **Name:**

Introduction to Calculus

There will be at least one question from your last unit on power functions!



1) Fill in the information below for the function graphed:

a) Domain: ________________ Range: ____________________

b) Asymptotes: ________________________

c) End Behavior: as $x \to \infty$, y __________ $x \to -\infty$, y __________

For what values of x is the function…

e) Concave up: __________________ Concave Down: _________________

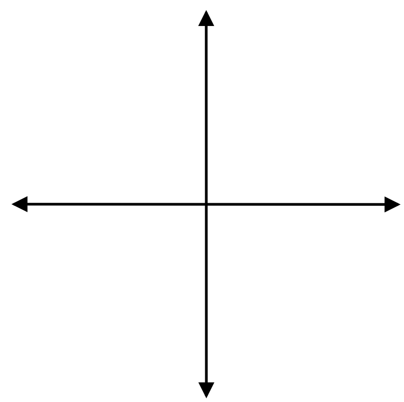
f) Increasing: ___________________ Decreasing: ____________________

g) Write a possible equation for the above power function: ___________________

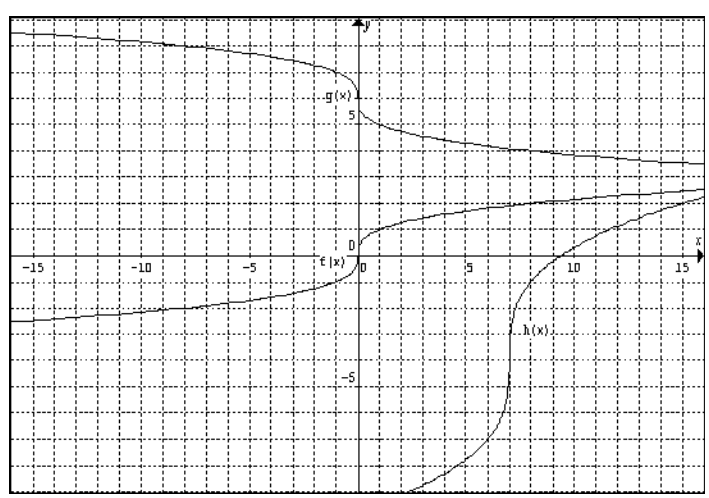
2) Sketch a power function with the following characteristics:

- Increasing for $x<0$ and decreasing for $x>0$.
- Concave up for the whole domain.
- End behavior: as $x \to \infty$, $y \to 0$ as $x \to -\infty$, $y \to 0$

Write a possible equation for the power function: ______________



3) Given the power function *f(x)* below, use the rules of shifting and stretching to determine the explicit equations of *f(x), g(x),* and *h(x).*



Know how to find roots (real and imaginary) of polynomials and sketch polynomials.

4a) Write the new function $f(x)$ that is created by shifting $y = x^3$ four units left and 8 units down.

b) Sketch a graph and use the graph to describe the roots of f(x) (how many roots? Real? imaginary?)

c) Write the function in standard form (i.e. expand and simplify…Remember Pascal!).

d) Find all three roots of this function.

5) A polynomial function of the form $ax^n + bx^{n-1} + cx^{n-2}\ldots$ has exactly _______________ roots (keeping in mind that some roots can be double or triple etc. roots and roots may be real and imaginary).

6) Assume the coefficient of the term with the largest degree (i.e. with the largest exponent) is **negative**, in a polynomial of degree **n**, where **n** is **even**:

As $x \to \infty, f(x) \to$ ________ As $x \to -\infty, f(x) \to$ ________

Explain why this is so:

7) Assume the coefficient of the term with the largest degree (i.e. with the largest exponent) is **negative**, in a polynomial of degree **n**, where **n** is **odd**:

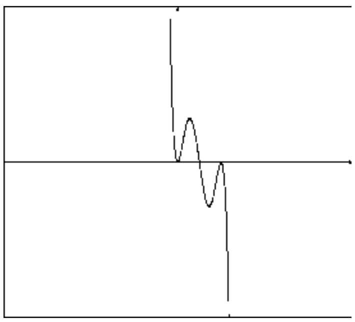
As $x \to \infty, f(x) \to$ ________ As $x \to -\infty, f(x) \to$ ________

Explain why this is so:

8) For the graphs below, determine the **degree** of the polynomial and if the coefficient of the highest term is positive or negative:

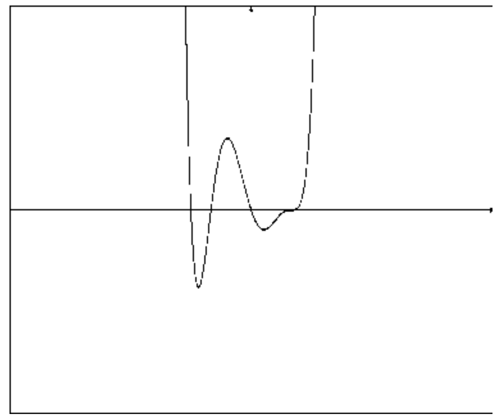
Degree ________

Positive or Negative leading coefficient ______

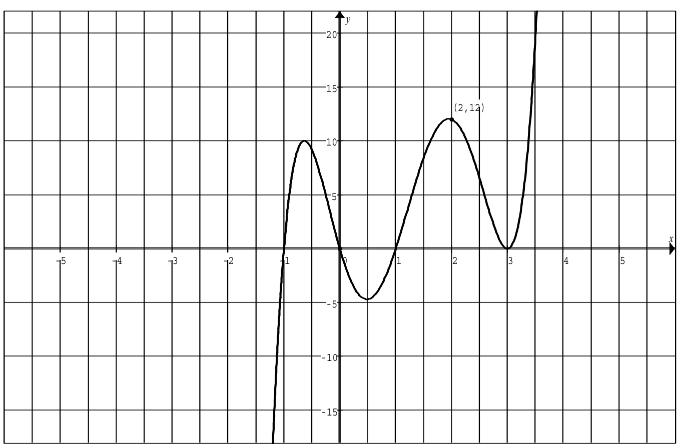


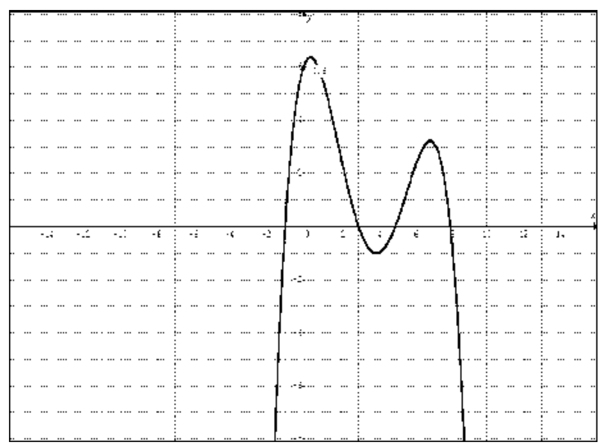
Degree ________

Positive or Negative leading coefficient __



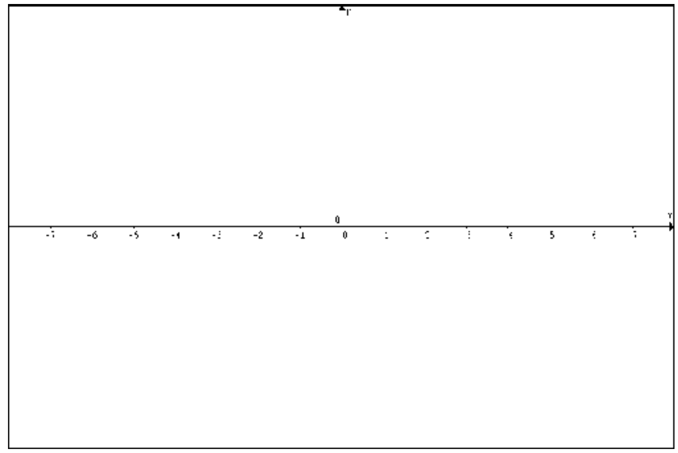
9) Find the equation for the graphs of the polynomials below. Find the specific "scale factor", k.



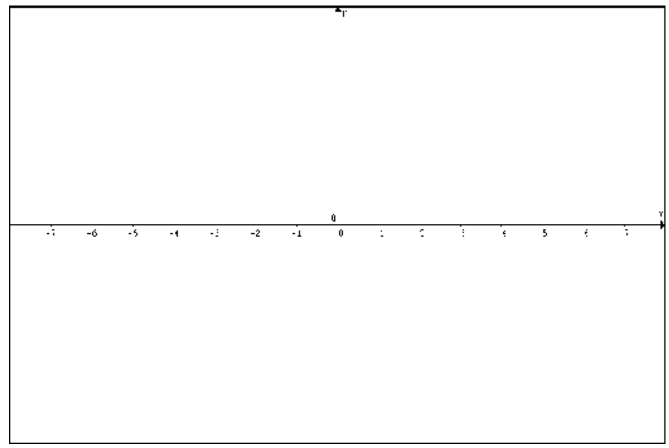


10) Sketch the following polynomials:

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



b) $f(x) = (2x-1)(x^2-9)(x^3+x^2)$



11) Find the roots of each polynomial below. (Use scrap paper when necessary!)

a) $x^4 - 5x^2 + 4 = 0$

b) $2x^3 + 3x^2 - 18x - 27 = 0$

c) $x^3 - 2x + 4 = 0$

d) $2x^3 + x^2 - 5x + 2 = 0$

12) Identify each conic section below as an ellipse, circle, hyperbola, or parabola.

a) $x^2 + 5y^2 = 12$

b) $2x^2 - 2y^2 = 6$

c) $x^2 = 12 - y^2$

d) $x^2 + (y-3)^2 = 16$

e) $3x^2 + y^2 - 2x + 6y = 10$

f) $12 = xy$

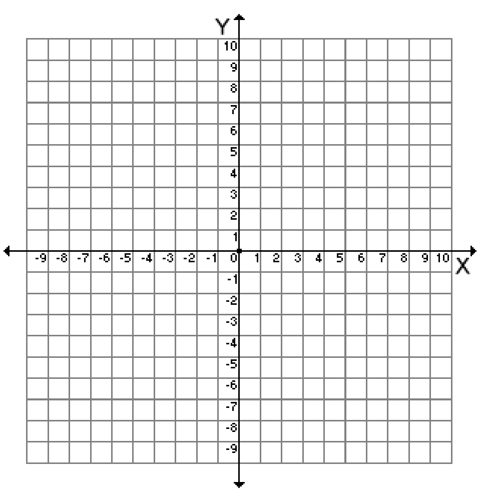
g) $2y^2 = x + 2$

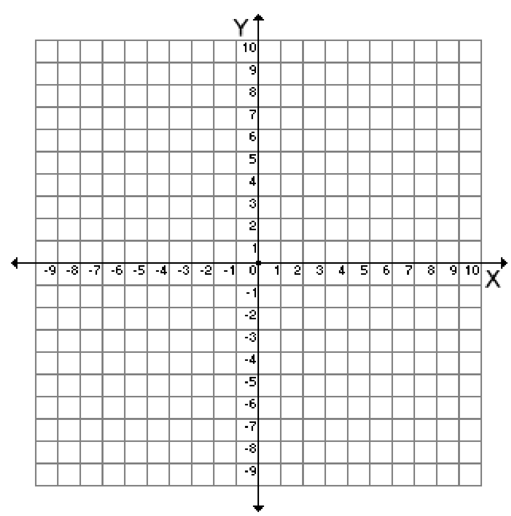
h) $8x^2 - 3y = 9 + y^2$

13) Sketch each conic section given. Clearly identify all x and y intercepts.

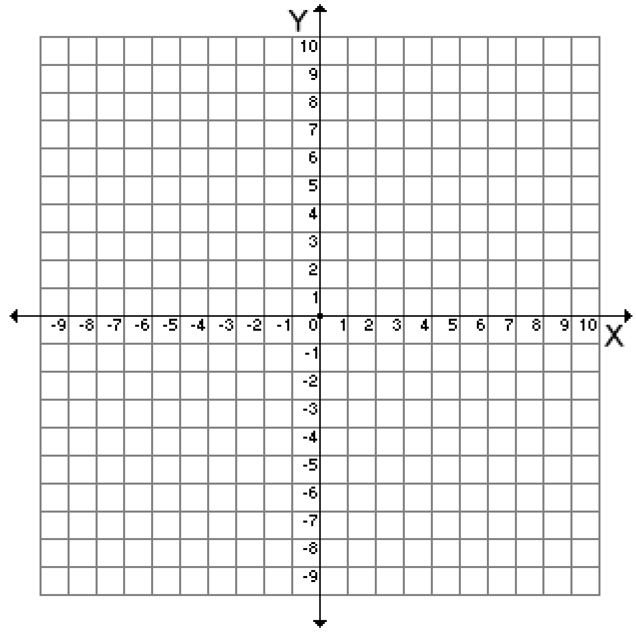
a) $(x-3)^2 + 2y^2 = 16$

b) Sketch $x^2 - 2y^2 = 36$





14) Graph $x^2 + 2x + y^2 - 6y = 6$



15) Graph each of the conic sections below. (Use scrap paper and graph paper as necessary!)

a) $\dfrac{(x-1)^2}{9} + \dfrac{(y+2)^2}{16} = 1$

b) $\dfrac{(x-1)^2}{9} - \dfrac{(y+2)^2}{16} = 1$

c) $-\dfrac{(x-1)^2}{9} + \dfrac{(y+2)^2}{16} = 1$

d) $25x^2 + 100x + 4y^2 - 8y + 4 = 0$