PRECALC AB PERIOD: _____ NAME:_____

Worksheet 58 - Polynomials

For each polynomial function given below, do the following:

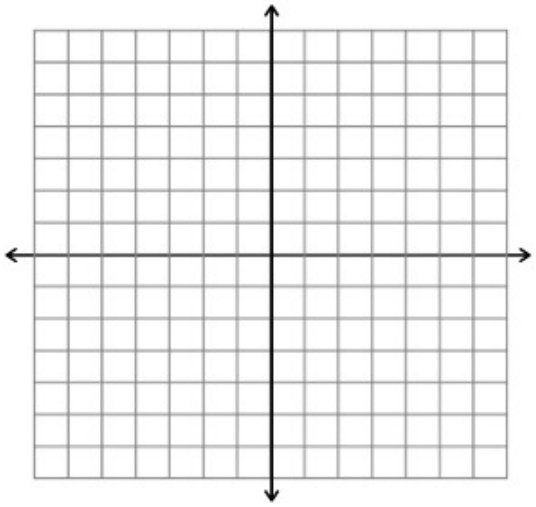
(a) Identity the leading term and determine the graph's end-behavior.

(b) Find the zeros and identify their multiplicities.

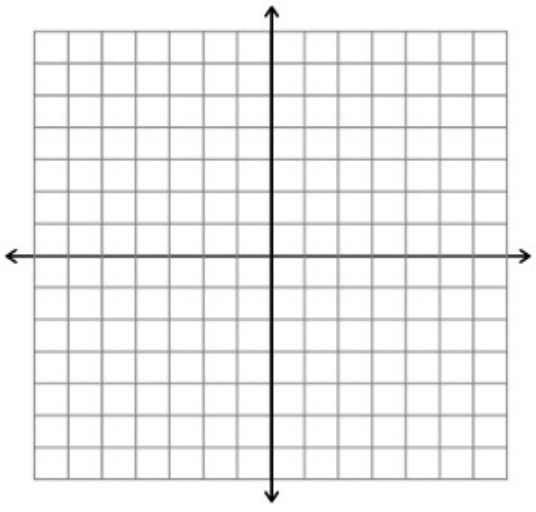
(c) Find the polynomial's y-intercept.

(d) Sketch the graph clearly showing the end-behavior, zeros, and y-intercept.

1. $f(x) = \frac{1}{16}(4-x)^2(1-x)^3(x+3)^2$



2. $g(x) = (x^4 - 16)^2$ Hint: Factor



3. Use the remainder theorem to determine if $x = -1$ is a zero and if so use long division to factor the polynomial.

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

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

   (c) $f(x) = 2x^3 + 21x^2 + 61x + 42$

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

4. Without using your calculator find all remaining real and complex zeros for the following polynomials:

   (a) $P(x) = x^4 + 2x^3 - 10x^2 - 18x + 9$, Zeros: $x = -3, 3$

   (b) $P(x) = x^4 - x^3 + 10x^2 - 9x + 9$, Zeros: $x = 3i$

5. For each polynomial function, (a) list all possible rational zeros, (b) use a graph to eliminate some of the possible zeros listed in part (a), (c) find all rational zeros, and (d) factor $P(x)$.

   (a) $P(x) = x^3 - 2x^2 - 13x - 10$

   (b) $P(x) = 6x^3 + 17x^2 - 31x - 12$

6. Consider the polynomial $P(x) = (x - k)(ax^2 + bx + c)$, with $a \neq 0$.

   (a) What is the degree of P?

   (b) What are the possible number of distinct real zeros of P?

   (c) What are the possible number of nonreal complex zeros of P?

   (d) Use the discriminant to explain how to determine the number and types of zeros of P.