3.2 Polynomials of Higher Degree

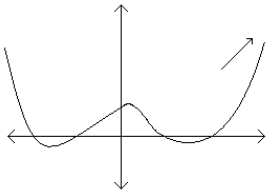
Name _____

Group Activity

Get into groups of three or four. This activity is to be done as a group.

1. This problem deals with the "positive end behavior" of polynomials, that is what happens to the height of the function as x goes to infinity (gets larger and larger).

For example, the function to the right increases as x becomes larger.



a) As x gets bigger and bigger, what happens to the height of the function $f(x) = 3x^3 - 2x + 2$? You might start by finding the height of the function at $x = 10$, $x = 100$ and $x = 1000$. You may also use a graphing calculator.

b) As x gets bigger and bigger, what happens to the height of the function $f(x) = -3x^3 + 2x + 2$?

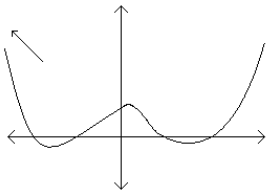
c) How about $f(x) = 3x^4 - 4x^3 + 2x + 2$?

d) How about $f(x) = 1 - 3x - 4x^3 + .1x^6$?

e) What rule could you state about the positive end behavior of a polynomial? **Explain your answer.** Does it matter what the lower degree terms are?

2. This problem deals with the "negative end behavior" of polynomials, that is what happens to the height of the function as x goes to negative infinity (gets smaller and smaller).

For example, the function to the right increases as x becomes very small.



a) First determine the positive end behavior of $f(x) = 3x^3 - 2x + 2$? Now x gets more and more negative, what happens to the height of the function $f(x)$? You might start by finding the height of the function at $x = -10$, $x = -100$ and $x = -1000$.

b) As x gets more and more negative, what happens to the height of the function $f(x) = -3x^3 + 2x + 2$? How is that related to what happens at the positive end?

c) How about $f(x) = 3x^4$?

d) How about $f(x) = -x^4$?

e) How about $f(x) = x^5$?

f) How about $f(x) = -x^5 + x^4$?

g) What rule could you state about the negative end behavior of a polynomial as it relates the the positive end behavior? **Explain your answer.** Does it matter what the lower degree terms are?

3. For quadratic functions, we found zeros by factoring (or using the quadratic formula to help us factor). Use the same reasoning below. Include the *multiplicity* for zeros which occur multiple times.

a) What are the zeros of the function $f(x) = x(x+3)(2x+3)$?

b) What are the x-intercepts of the function $h(t) = t^3 + 2t^2 - 4t$?

c) Factor the function $h(t) = t^3 + 2t^2 - 4t$.

d) Find all solutions to $0 = 4x^4 + 2x^3 - x^2$.

e) Find all zeros of $f(x) = (x^2 + 3x - 4)(x+4)(2x^2 - 1)$.