Math 3

4.5 Fundamental Theorem of Algebra

Unit 4

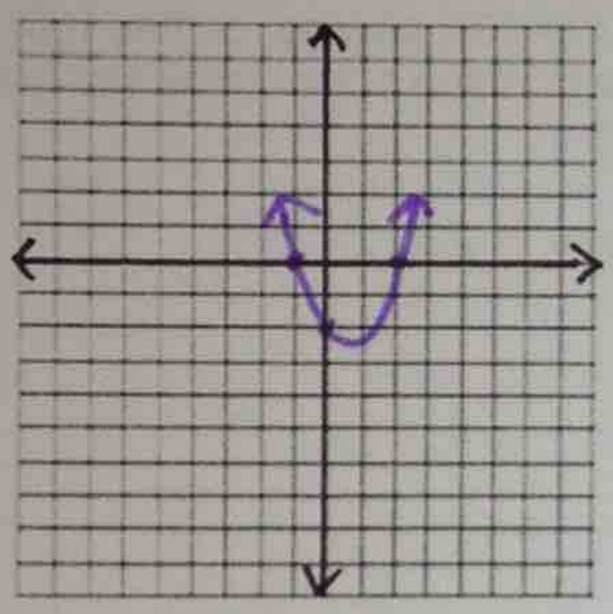
SWBAT use the Fundamental Theorem of Algebra and end behavior to graph polynomials of nth degree.

Fundamental Theorem of Algebra: An n^{th} degree polynomial function has n roots.

Multiplicity: This refers to the number of times the root is a zero of the function. We can have "repeated" zeros (think about double roots with quadratics).

Example 1: Determine the degree of each polynomial, the roots of the function (and multiplicity), and then sketch the polynomial based on the end behavior.

a) $f(x) = (x+1)(x-2)$



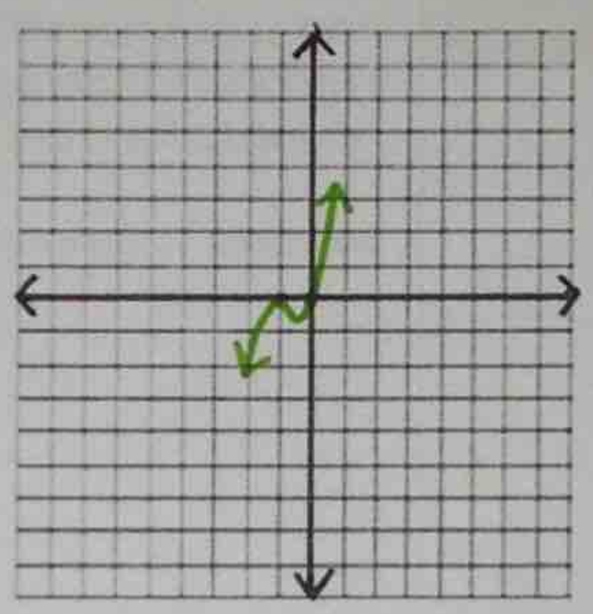
quadratic ↑↑ y-int: (0, -2)

$x = -1 \quad x = 2$

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

$x \to \infty,\ f(x) \to \infty$

b) $f(x) = x(x+1)^2$



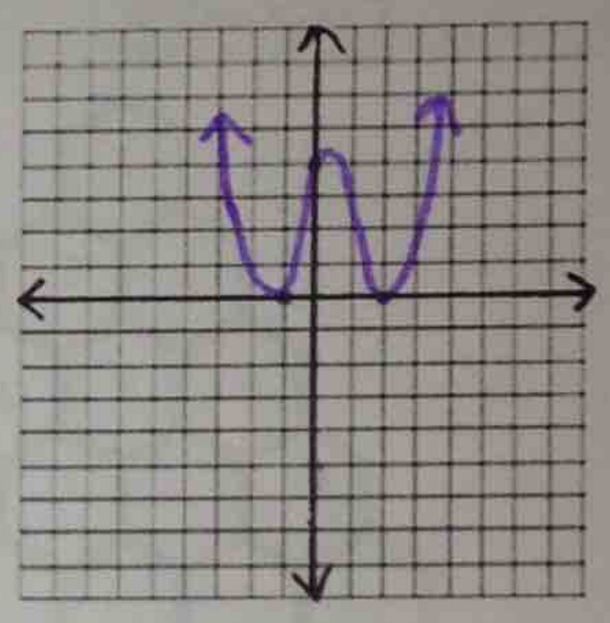
cubic ↗↘ y-int: (0,0)

$x = 0 \quad x = -1$ (M: 2)

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

$x \to \infty,\ f(x) \to \infty$

c) $f(x) = (x+1)^2(x-2)^2$



quartic ↝↝

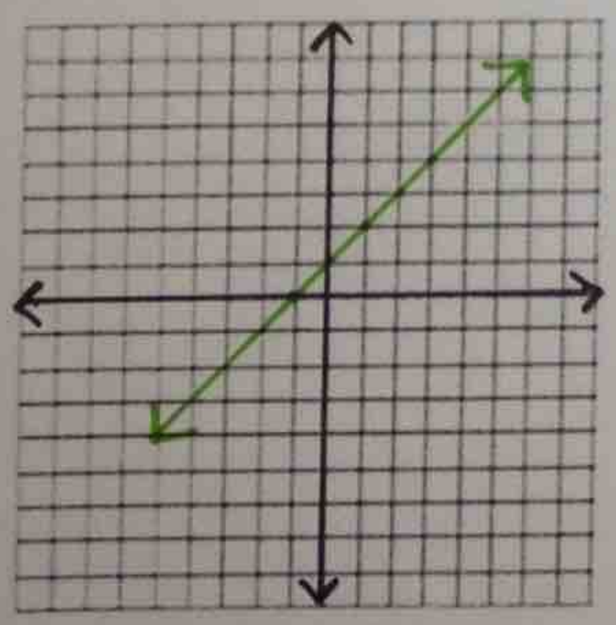
$x = -1$ (M: 2) y-int: (0, 4)

$x = 2$ (M: 2)

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

$x \to \infty,\ f(x) \to \infty$

d) $f(x) = x + 1$



Linear ↗

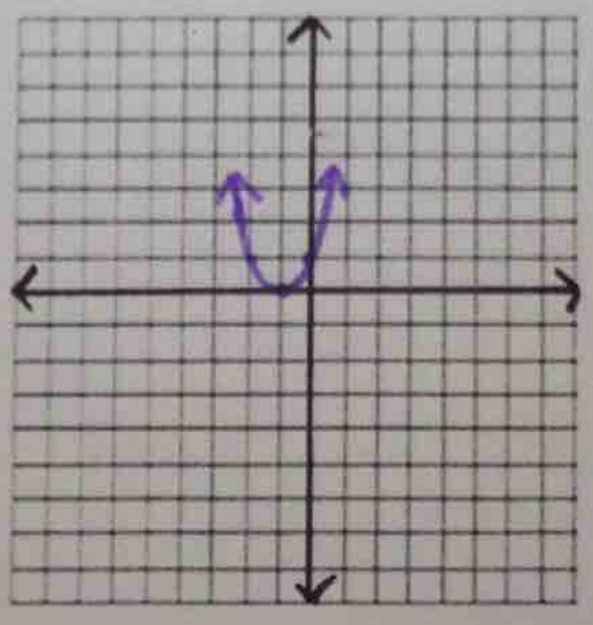
$x = -1$

y-int: (0, 1)

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

$x \to \infty,\ f(x) \to \infty$

e) $f(x) = (x+1)^2$



quadratic ↘↗

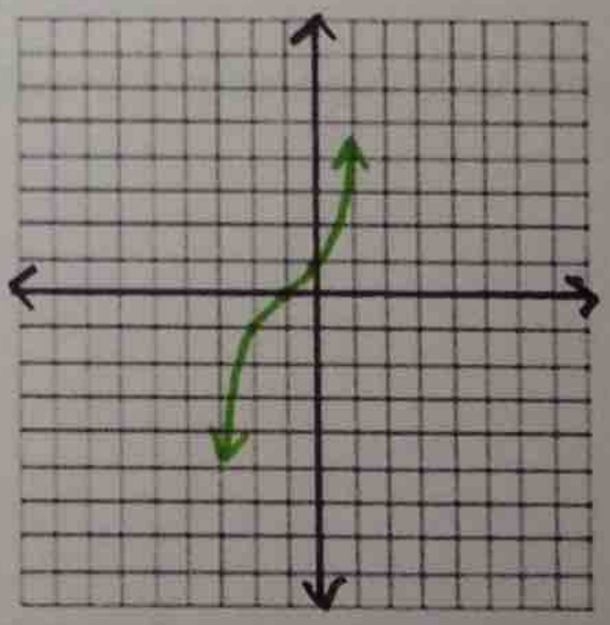
$x = -1$ (M: 2)

y-int: (0, 1)

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

$x \to \infty,\ f(x) \to \infty$

f) $f(x) = (x+1)^3$



cubic ↙↗

$x = -1$ (M: 3)

y-int: (0, 1)

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

$x \to \infty,\ f(x) \to \infty$