9.2 Complex Zeros

- I can find all zeros of a polynomial including non-real complex zeros
- I can write a polynomial from its zeros
- I can do a linear factorization

Fundamental Theorem of Alg: an nth degree polynomial will have n complex zeros

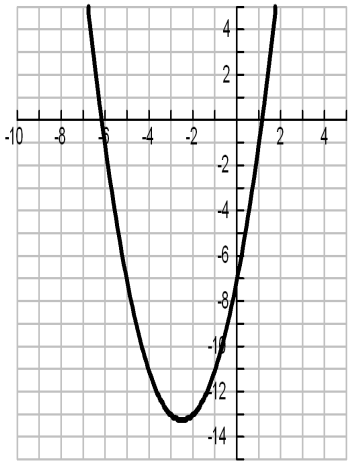
(May be a combination of real and non-real complex. Some zeros may be repeated)

Complex Conjugates: complex imaginary factors come in conjugate pairs

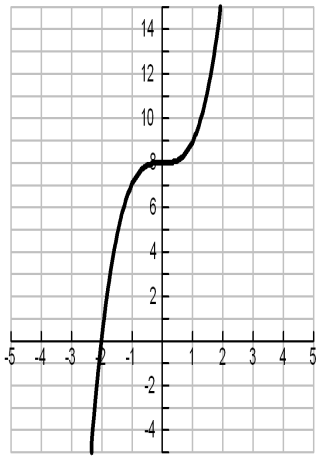
(if 3i is a zero, - 3i is also)

How many complex zeros does each function have? How many are real? How many are non-real?

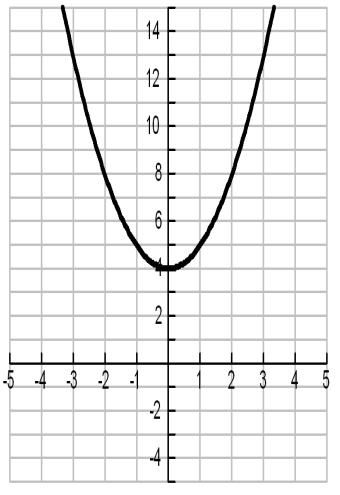
$x^2 + 5x - 7$



$x^3 + 8$



$x^2 + 4$



Find all zeros of the following polynomial using the quadratic formula:

$$f(x) = x^2 + 2x + 11$$

$a = 1$
$b = 2$
$c = 11$

$$\frac{-2 \pm \sqrt{2^2 - 4(1)(11)}}{2(1)}$$

$$\frac{-2 \pm \sqrt{-40}}{2}$$

$\sqrt{-40} = \sqrt{40}\,i = 2\sqrt{10}\,i$

$$\frac{-2 \pm 2i\sqrt{10}}{2}$$

$$-1 \pm i\sqrt{10}$$

Find all zeros of the following polynomial using the quadratic formula:

$$f(x) = x^2 - x - 4$$

$-1.5, 2.5$

Find all zeros by factoring and using the quadratic formula

$$f(x) = x^3 - 4x^2 + 11x$$

$x(x^2 - 4x + 11)$

$x = 0$

$a = 1$
$b = -4$
$c = 11$

$$\frac{4 \pm \sqrt{16 - 44}}{2}$$

$$\frac{4 \pm \sqrt{-28}}{2}$$