Sec 3.2.2 Polynomials
* Finding Zeros
*determining behavior from multiplicities

Determine the zeros of:

$f(x) = x^3 + 3x^2 - x - 3 = 0$

$(x^3 + 3x^2) + (-x - 3)$

$x^2(x+3) - 1(x+3)$

$(x+3)(x^2-1) = 0$

$(x+1)(x-1)$

$x = -3, \pm 1$

Find the zeros of:

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

LC < 0
factor it out

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

$$-x^2(x^2 - 4x + 4) = 0$$

$$-x^2(x-2)(x-2) = 0$$

$$x = \{0, 2\}$$

Find the zeros of:

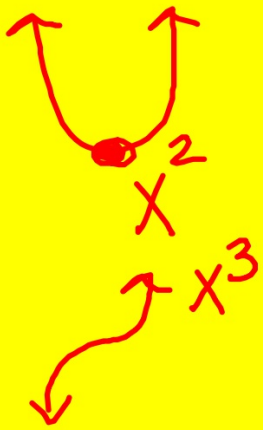
$f(x) = 3(x-4)(x+6)(x+8)^2$

$X = \{-8, -6, 4\}$

Multiplicities

If a zero occurs an even number of times, the graph will "touch" the x-axis and turn.

If a zero occurs an odd number of times, the graph will cross the x-axis.



Again, like end-behavior, use what you know about x^2 and x^3
Which turns?
Which crosses?

Given $f(x) = \frac{1}{2}(x+1)^1(2x-3)^2$ find the zeros, their multiplicities and state whether the graph crosses the x-axis or turns.

$X = \{-1, 3/2\}$

cross turn

The same-

Given $f(x) = -4(x+\frac{1}{2})^2(x-5)^3$ determine the zeros, multiplicities and if the graph will cross or turn at the x-axis.

$X = \{-1/2, 5\}$

turns cross

Suggested Practice-

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25. x = 5, mult 1, crosses
    x = -4, mult 2, touches
26. x = -5, mult 1, crosses
    x = -2, mult 2, touches
27. x = 3, mult 1, crosses
    x = -6, mult 3, crosses
28. x = -½ , mult 1, crosses
    x = 4, mult 3, crosses
29. x = 0, mult 1, crosses
    x = 1, mult 2, touches
30. x = 0, mult 1, crosses
    x = -2, mult 2, touches
31. x = 2, -2 and -7, mult 1, all cross
32. x = -5, -3, 3, mult 1, all cross