

Sec 3.2 Polynomials

* Finding Zeros

*determining behavior from
multiplicities

Find the zeros of:

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

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

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

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

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

$$x = -3, \pm 1$$

Find the zeros of:

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

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

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

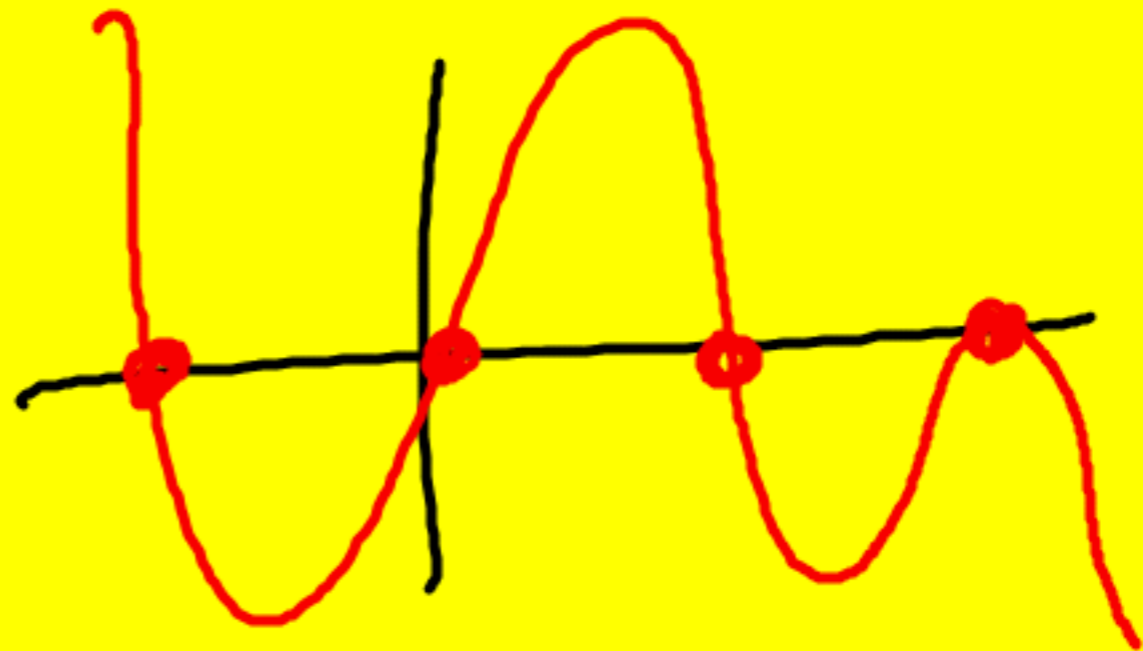
$$-x^2(x-2)(x-2) = 0$$

$$x = 0, 2$$

Find the zeros of:

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

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



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

$$x = -1$$

mult
1

crosses

$$x = \frac{3}{2}$$

mult
2

turns

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.

$$x = -\frac{1}{2}$$

mult
2

turn

$$x = 5$$

mult
3

crosses

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. $x = -\frac{1}{2}$, 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