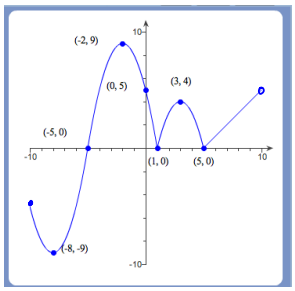
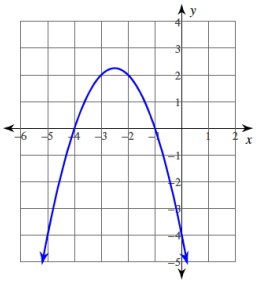
5.4 Solving Inequalities



$f(x) \geq 0$
$[-5, 10)$

$f(x) > 0$
$(-5, 1) \cup (1, 5) \cup (5, 10)$

$f(x) < 0$
$[-10, -5)$



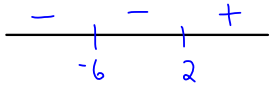
$f(x) < 0$
$(-\infty, -4) \cup (-1, \infty)$

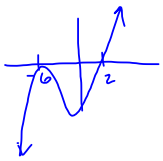
$f(x) \geq 0$
$[-4, -1]$

$(x+6)^2 (x-2) > 0$

(+) (+)

Zeros: 2, -6

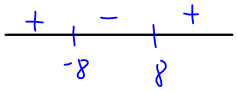




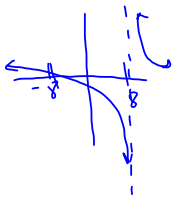
$(2, \infty)$

$\frac{x+8}{x-8} < 0$

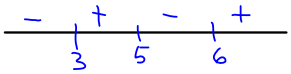
(+) (+)



$(-8, 8)$



$(x-3)(x-5)(x-6) \geq 0$

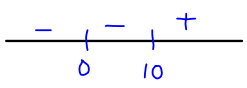


$[3, 5] \cup [6, \infty)$

$x^3 - 10x^2 > 0$

$x^2(x-10) > 0$

(+) (-)



$(10, \infty)$

5.5 Zeros & Factors

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

is $x-1$ a factor?

If $2(1)^4 - 4(1)^3 + 6(1) - 4 = 0$

$2 - 4 + 6 - 4$

0

Yes $x-1$ is a factor

List all possible zeros.

$f(x) = 7x^4 - 5x^3 + x^2 - x + 1$

$\pm 1, \pm 7$ ± 1

$\pm 1, \pm \frac{1}{7}$

List all possible zeros.

$f(x) = 14x^4 - x^2 + 4$

$1, 2, 7, 14$ $1, 2, 4$

$\pm 1, \pm \frac{1}{2}, \pm \frac{1}{7}, \pm \frac{1}{14},$

$\pm 2, \pm \frac{2}{7}, \pm 4, \pm \frac{4}{7}$

Find all the Zeros:

$f(x) = x^3 + 7x^2 - 49x - 55$

1 $1, 5, 11, 55$

Possible: $\pm 1, \pm 5, \pm 11, \pm 55$

$(-1)^3 + 7(-1)^2 - 49(-1) - 55 = 0$

0

$-1, 5, -11$

$-1 \;\big|\; 1 \quad 7 \quad -49 \quad -55$

$\qquad\quad -1 \quad -6 \quad -55$

$\qquad 1 \quad 6 \quad 55 \quad 0$

Intermediate Value Theorem

$f(x) = 13x^4 - 5x^2 + 7x - 1 \;;\; [0, 3]$

$13(3)^4 - 5(3)^2 + 7(3) - 1$

yes we have a zero between $[0, 3]$