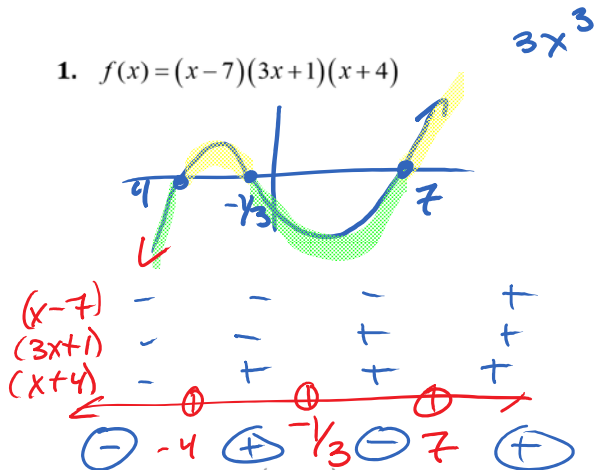# 2.8 Day 1 Notes

Precalculus

2.8 Day 1 – Solving Inequalities

Name:

Period:

Create a sign chart and determine the real values of x that cause the polynomial function to be:

   a. Zero
   b. Undefined
   c. Positive
   d. Negative
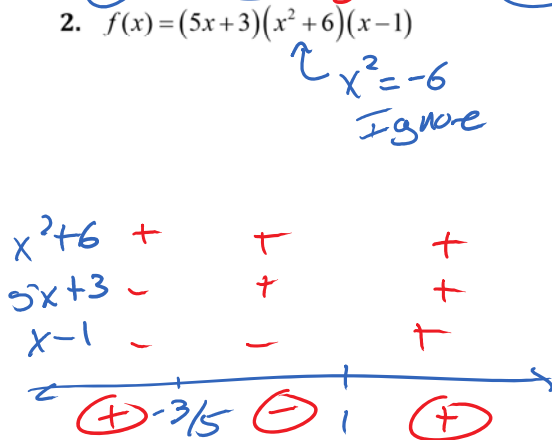
1. $f(x)=(x-7)(3x+1)(x+4)$

$3x^3$

Zero: $7 \quad -\frac{1}{3} \quad \cdot \quad 4$

Undefined: _____

Positive: $(-4,-\frac{1}{3}) \cup (7,\infty)$
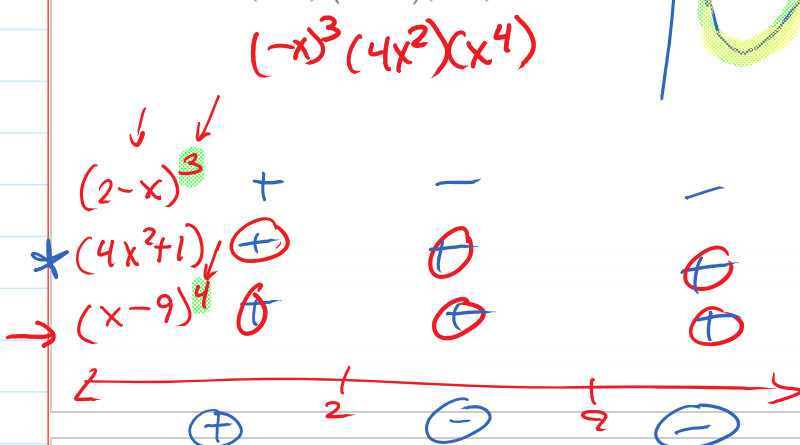
Negative: $(-\infty,-4) \cup (-\frac{1}{3},7)$

$(x-7)$ $-$ $-$ $-$ $+$

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

$(x+4)$ $-$ $+$ $+$ $+$

$\ominus \quad -4 \quad \oplus \quad -\frac{1}{3} \ominus \quad 7 \quad \oplus$

2. $f(x)=(5x+3)(x^2+6)(x-1)$

$x^2=-6$

Ignore

Zero: $-\frac{3}{5} \quad , \quad 1$

Undefined: X

Positive: $(-\infty,-\frac{3}{5}) \cup (1,\infty)$

Negative: $(-\frac{3}{5},1)$

x^2+6 $+$ $+$ $+$

$5x+3$ $-$ $+$ $+$

$x-1$ $-$ $-$ $+$

$\oplus \quad -\frac{3}{5} \quad \ominus \quad 1 \quad \oplus$

3. $f(x)=(2-x)^3(4x^2+1)(x-9)^4$

$(-x)^3(4x^2)(x^4)$

$-4x^9$

$(2-x)^3(4x^2+1)(x-9)^4 > 0$

< 0

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

$(4x^2+1)$ $\oplus$ $\oplus$ $\oplus$

$(x-9)^4$ $\oplus$ $\oplus$ $\oplus$

$\oplus \quad 2 \quad \ominus \quad 9 \quad \ominus$

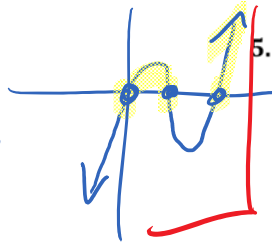Zero: $2 \quad , \quad 9$

Undefined: N/A

Positive: $(-\infty,2)$

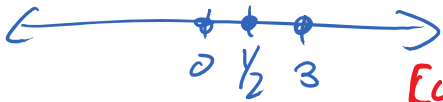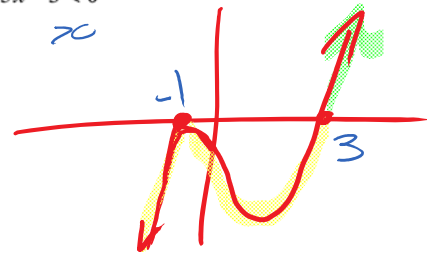Negative: $(2,9) \cup (9,\infty)$

Use your calculator to solve the following polynomial inequalities graphically.

4. $2x^3 - 5x^2 + 3x \geq 0$
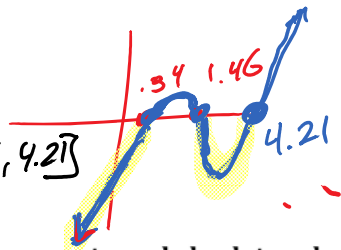
$x(2x^2 - 5x + 3)$

$x(2x - 1)(x - 3) \geq 0$

0   $\frac{1}{2}$ 3

$[0, \frac{1}{2}] \cup [3, \infty)$

5. $x^3 - x^2 - 5x - 3 < 0$

$(-\infty, -1) \cup (-1, 3)$

6. $x^3 - 6x^2 \leq 2 - 8x$

$x^3 - 6x^2 + 8x - 2 (\leq) 0$

$(-\infty, .34] \cup [1.46, 4.21]$

.34 1.46 4.21

What happens if there are fractions, square roots, and absolute values involved?

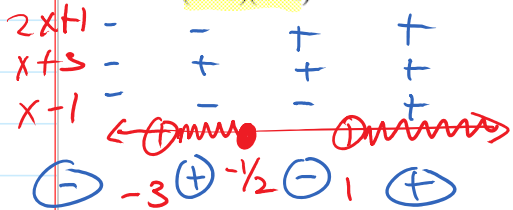- Numerators: X-int. (Zeros)
- Denominators: Graph is undefined

Remember:

1) A fraction is undefined when: Denominator = 0

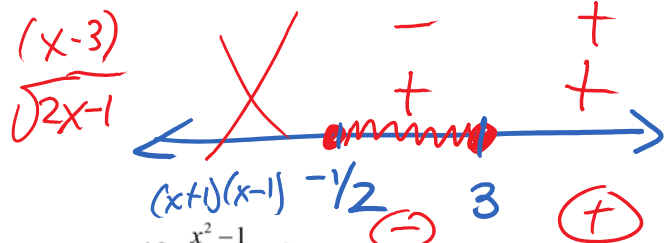2) A square root is undefined when: it is negative

Try it!

$(-3, -\frac{1}{2}] \cup (1, \infty)$
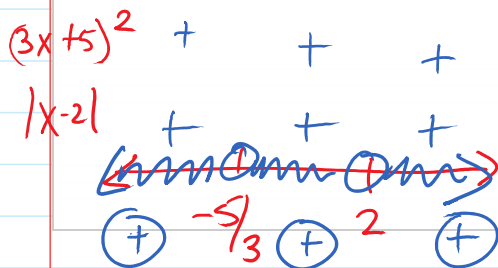
7. $\dfrac{2x+1}{(x+3)(x-1)} \geq 0$

$2x+1$ —
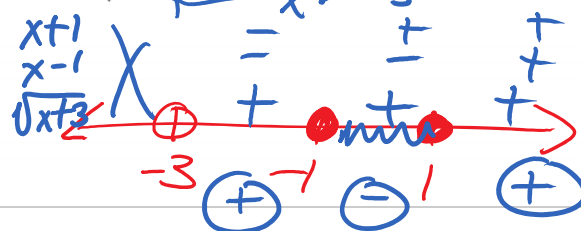$x+3$ =
$x-1$ =

$\ominus$ -3 $\oplus$ $-\frac{1}{2}$ $\ominus$ 1 $\oplus$

8. $(x-3)\sqrt{2x+1} \leq 0$

$2x+1 \geq 0$

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

$(x-3)$
$\sqrt{2x-1}$

$(x+1)(x-1)$ $-\frac{1}{2}$ 3
$\ominus$ $\oplus$

9. $(3x+5)^2 |x-2| > 0$

$(3x+5)^2$ +
$|x-2|$ +

$\oplus$ $-\frac{5}{3}$ $\oplus$ 2 $\oplus$

10. $\dfrac{x^2-1}{\sqrt{x+3}} \leq 0$

$x > -3$

$x+1$
$x-1$
$\sqrt{x+3}$

-3 $\oplus$ -1 $\ominus$ 1 $\oplus$

$[-1, 1]$

$(-\infty, -5/3) \cup (-5/3, 2) \cup (2, \infty)$