Sec 3.6
Solving Rational Inequalities

$$\frac{-X-5}{X+3} \geq 0$$
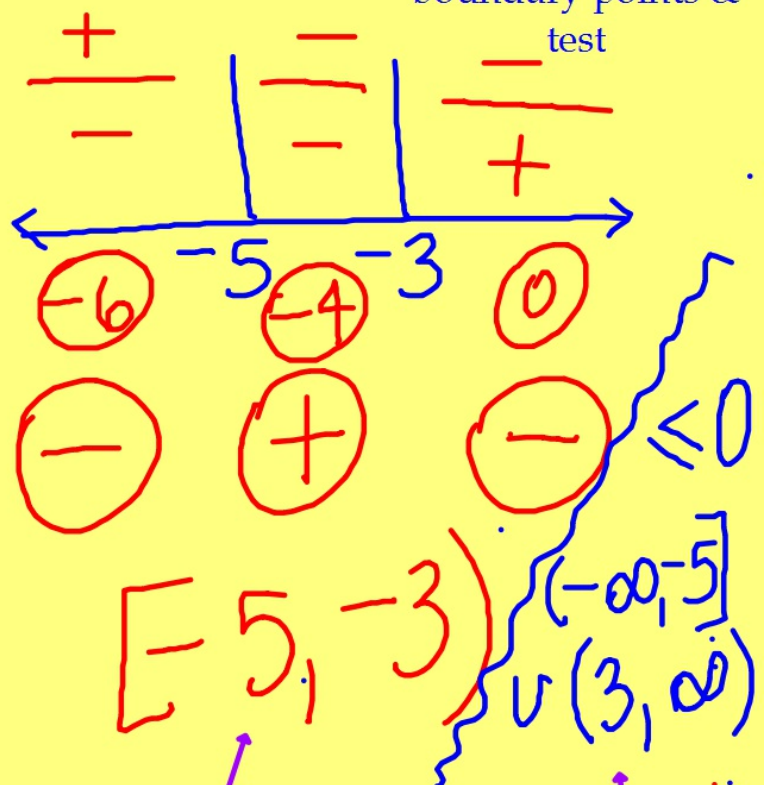
$-X-5 = 0$

$-X = 5$

$$\boxed{\begin{array}{l} X = 5 \\ X = -3 \end{array}}$$

What number causes the numerator and denominator to be equal to zero? These are the critical numbers.

1. set = to zero
2. get a common denominator
3. condense to a single fraction
4. determine the boundary points & test

$$\frac{+}{-} \quad \frac{-}{-} \quad \frac{-}{+}$$

$\overset{-6}{\ominus} \quad \overset{-5}{\underset{-4}{\oplus}} \quad \overset{-3}{\underset{0}{\ominus}} \quad < 0$

$[5, -3)$ $(-\infty, -5]$

$\cup (3, \infty)$

Answer

Answer if I changed the inequality to less than 0.

Determine all values that satisfy the
following inequality-

$$\frac{X}{X-1} > 2$$

$$\frac{X}{X-1} - 2 > 0$$

$$\frac{X}{X-1} - 2\left(\frac{X-1}{X-1}\right) > 0 \quad \longleftarrow \text{common denominator}$$

$$\frac{X - 2X + 2}{X-1} > 0$$

$$\frac{-X+2}{X-1} > 0 \quad \longleftarrow \text{critical \#'s at 1 \& 2}$$

$$\frac{+}{-} \quad | \quad \frac{+}{+} \quad | \quad \frac{-}{+} \quad \longleftarrow \text{into } -X+2$$
$$\longleftarrow \text{into } X-1$$

0   1.5   2   3   ← test #'s

⊖   ⊕   ⊖ ← results

for > 0 we want positives
so
$(1, 2)$ ← answer

A ball is thrown vertically upward from the top of a 190 foot tower with an initial velocity of 96 feet/second. During which time period will the ball's height exceed that of the tower?

Use- $s(t) = -16t^2 + v_0 t + s_0$

...s(t) determines height above ground, where v_0 is the initial velocity, t is time (seconds) and s_0 is the initial height (feet)

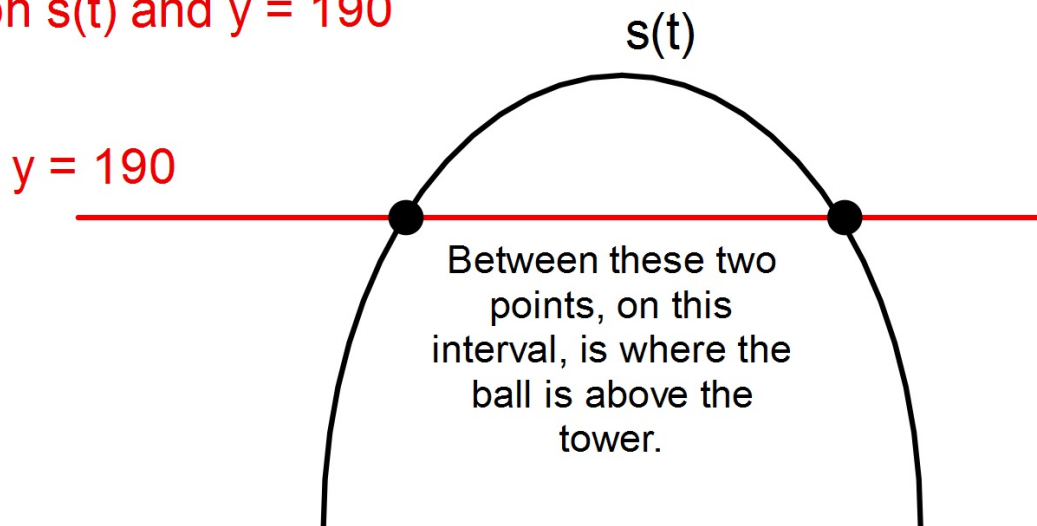$(0, 6)$

between 0 & 6 seconds

$$s(t) = -16t^2 + 96t + 190$$

$$-16t^2 + 96t + 190 > 190$$

$$-16t^2 + 96t > 0$$

$$-16t(t - 6) > 0$$

$$(+)(-) \quad (-)(-) \quad (-)(+)$$

$(-1) \quad 0 \quad (1) \quad 6 \quad (7)$

$(-) \quad (+) \quad (-)$

y = 190

s(t)

Between these two
points, on this
interval, is where the
ball is above the
tower.

Several ways to determine- table,
math/intersect menu and, my
preferred, "trace".

Suggested Practice
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43,49,55,57,75,76

43. $(-\infty, -3) \cup (4, \infty)$

49. $(-\infty, -4/3) \cup [2, \infty)$

55. $(-\infty, -5) \cup (-3, \infty)$

57. $(-\infty, +1/2) \cup [7/5, \infty)$

75. between 0 and 1/2

76. between 0 and 3