§1.5 #s107, 113,

(107) $-\frac{1}{2}gt^2 + v_0t + s_0 = h(t)$ is THE equation for falling body under gravity.

g = acceleration due to gravity $\left(\frac{ft}{s^2}, \frac{m}{s^2}\right)$

v_0 = initial velocity $\left(\frac{ft}{s}, \frac{m}{s}\right)$

s_0 = initial height (ft, m)

When does ball return to 4ft

t = time (sec)

h = height of ball, in ft, as function of time.

$g = 32\frac{ft}{s^2}$, $40 ft/sec = v_0$, $4 ft = s_0$

$h(t) = -\frac{1}{2}(32)t^2 + 40t + 4 \overset{SET}{=} 4$

$\Rightarrow -16t^2 + 40t = 0$

$\Rightarrow -4t(4t - 10) = 0$

$\Rightarrow -4t = 0$ $\quad 4t - 10 = 0$

$t = 0$

$4t = 10$

$t = \frac{10}{4} = \frac{5}{2} = t = 2.5$

Solve by completing the square

$4x^2 + 7x + 29 = 0$

Leading coefficient is '4'.

$\Rightarrow x^2 + \frac{7}{4}x + \frac{29}{4} = 0$

LCD: 64

$\Rightarrow x^2 + \frac{7}{4}x + \left(\frac{7}{8}\right)^2 - \frac{49}{64} + \frac{29}{4} = 0$

$\Rightarrow \left(x + \frac{7}{8}\right)^2 + \frac{-49}{64} + \frac{29}{4}\cdot\frac{16}{16} = 0$

$\left(x+\frac{7}{8}\right)^2 + \frac{-49+464}{64} = 0$

$\left(x + \frac{7}{8}\right)^2 + \frac{415}{64} = 0$

$\left(x + \frac{7}{8}\right)^2 = -\frac{415}{64}$

$A^2 = B$

$\sqrt{A^2} = \sqrt{B}$

$|A| = \sqrt{B}$

$A = \pm\sqrt{B}$

$x + \frac{7}{8} = \pm\sqrt{-\frac{415}{64}} = \pm i\sqrt{\frac{415}{16}}$

$= \pm i\frac{\sqrt{415}}{\sqrt{64}} = \pm i\frac{\sqrt{415}}{8}$

$\Rightarrow x + \frac{7}{8} = \pm i\frac{\sqrt{415}}{8}$

$\Rightarrow x = -\frac{7}{8} \pm i\frac{\sqrt{415}}{8}$

$29 = 16 + 13$

1374

290

464

$-\ 49$

415

$5 \mid 415$

83

Skills: simplifying $\sqrt{\text{number}}$

Do something sick, like factoring this bad boy.

$4(x - (-\frac{7}{8} + i\frac{\sqrt{415}}{8}))(x - (-\frac{7}{8} - i\frac{\sqrt{415}}{8}))$ Fine

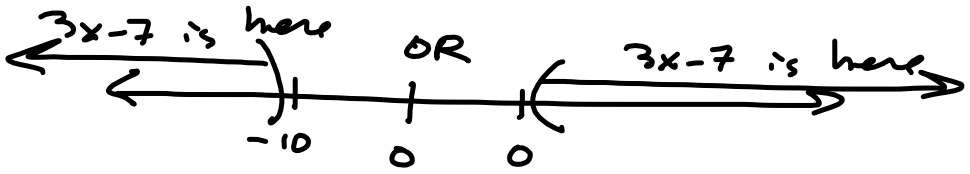
$= 4x^2 + \cdots$ (2·2)

$= (2x - (-\frac{7}{4} + i\frac{\sqrt{415}}{4}))(2x - (-\frac{7}{4} - \frac{\sqrt{415}}{4}i))$

S 1.7

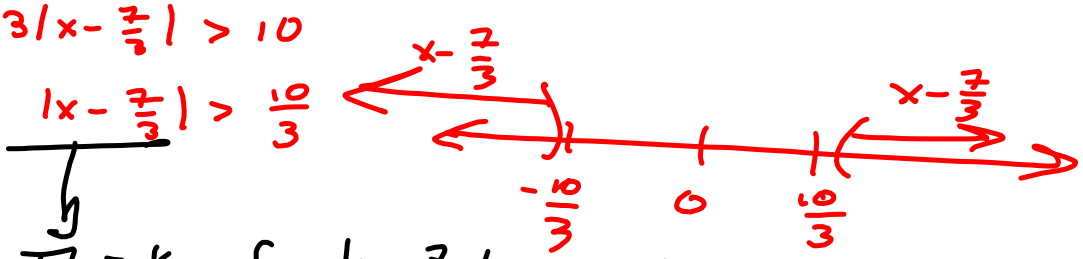
$|3x-7| \geq 10 \Rightarrow$

$3x-7 \geq 10$ OR $3x-7 \leq -10$

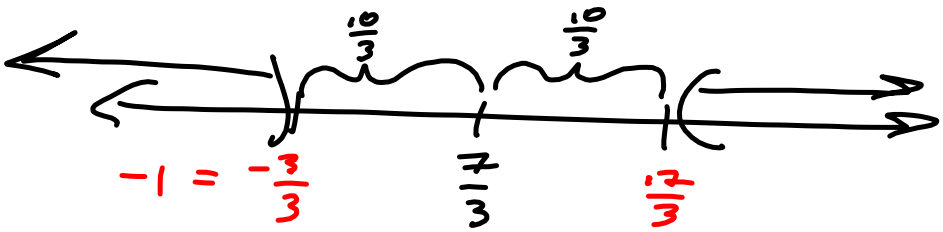


$3|x-\frac{7}{3}| > 10$

$|x-\frac{7}{3}| > \frac{10}{3}$



Think of $|x-\frac{7}{3}|$ as how far x is from $\frac{7}{3}$.



$x < -1$ OR $x > \frac{17}{3}$

$|3x-7| > 10 \Rightarrow$

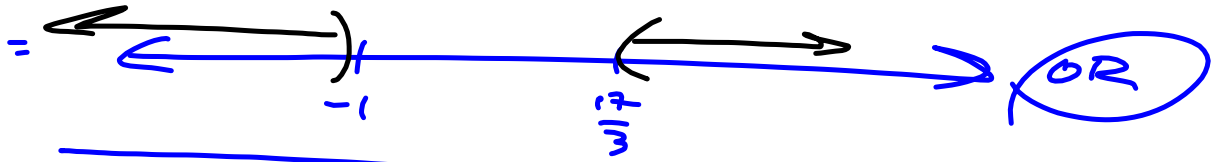
$3x-7 > 10$ OR $3x-7 < -10$

$3x > 17$ $\qquad$ $3x < -3$

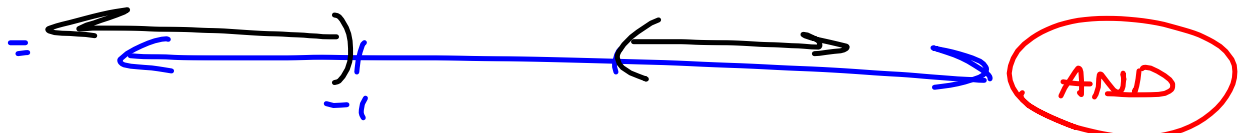
Set-builder notation

$\{x \mid x > \frac{17}{3}$ OR $x < -\frac{3}{3} = -1\}$

$=$



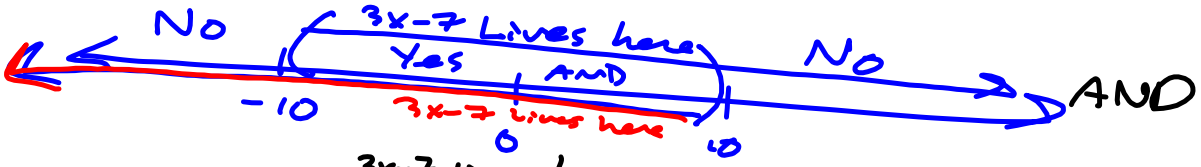
$= (-\infty, -1) \cup (\frac{17}{3}, \infty)$ Interval Notation.

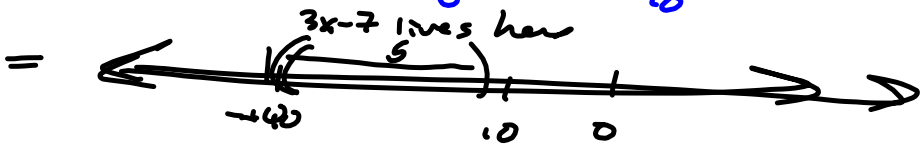


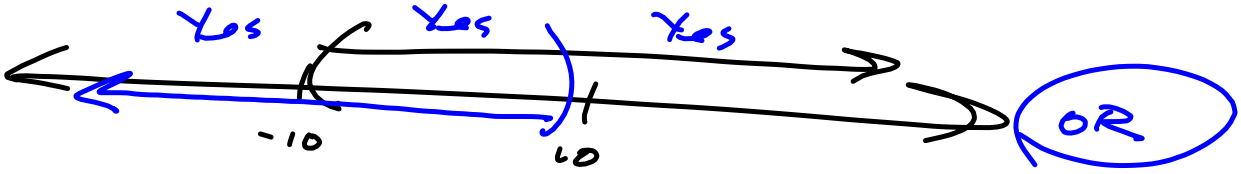
$= \emptyset$

$|3x-7| \leq 10 \Rightarrow$

$3x-7 \leq 10$ AND $3x-7 \geq -10$







$= (-\infty, \infty)$