Solve the inequalities. Write your solution in interval notation.

**1.** (5pts) $-3 \leq 4x + 1 < 6$   $|-1$

$-4 \leq 4x < 5$   $|\div 4$

$-1 \leq x < \frac{5}{4}$

$[\underset{-1}{\hphantom{xx}}\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\underset{\frac{5}{4}}{)}$

$\left[-1, \frac{5}{4}\right)$

**2.** (7pts) $5 - 3x < 1$ or $8 - x > 9$   $|-8$

$-3x < -4 \qquad -x > 1$   $|\div(-1)$

$x > \frac{4}{3}$ or $x < -1$

$\underset{-1}{\hphantom{xx})} \qquad \underset{9/2}{(\hphantom{xx}}$

$(-\infty, -1) \cup \left(\frac{4}{3}, \infty\right)$

**3.** (6pts) Find the domain of the function in interval notation: $f(x) = \dfrac{\sqrt{4x - 6}}{3x - 10}$ .

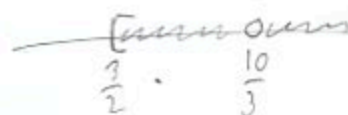Must have $4x - 6 \geq 0$

$4x \geq 6$

$x \geq \frac{6}{4}$

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

Can't have

$3x - 10 = 0$

$3x = 10$

$x = \frac{10}{3}$

$\underset{\frac{3}{2}}{[\hphantom{xx}} \cdot \underset{\frac{10}{3}}{(\hphantom{xx}}$

$\left[\frac{3}{2}, \frac{10}{3}\right) \cup \left(\frac{10}{3}, \infty\right)$

**4.** (14pts) For her daughter's quinceañera, Valeria is planning to rent an event venue. She is considering Party Deck, which charges \$150 per event plus \$30 per hour, or Fiesta Bay, which charges \$225 per event, which includes two hours, and then \$20 per hour for every hour after the first two. Valeria's party will last at least two hours. For which number of hours is Fiesta Bay the better option for her? Solve as an inequality.

$x =$ number of hours needed

Party Deck cost is $150 + 30x$

Fiesta Bay cost is $225 + 20(x-2)$

Need:   Fiesta Bay $\leq$ Party Deck

$225 + 20(x-2) \leq 150 + 30x$

$225 + 20x - 40 \leq 150 + 30x$   $|-20x$

$185 \leq 150 + 10x$   $|-150$

$35 \leq 10x$

$3.5 \leq x$

For parties longer than 3.5 hrs,
Fiesta Bay is the better option.

**5.** (14pts) A car enters a highway, driving 67 mph. At the same time, 27 miles down the road, a truck enters the same highway, and travels at 54 mph in the same direction as the car.

a) How long did it take the car to catch up with the truck?

b) How far did the car travel along the highway before it caught up with the truck?

car

$d, 67, t$

$d-27, 54, t$

truck
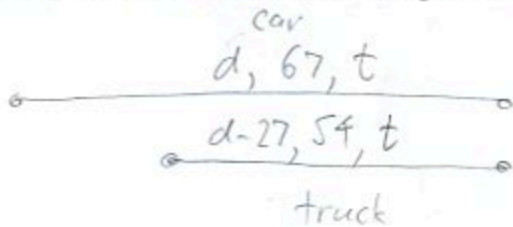
$\left.\begin{array}{l} d = 67t \\ d-27 = 54t \end{array}\right\} \Rightarrow \quad 67t - 27 = 54t \quad | -54t$

$\qquad 13t - 27 = 0 \quad | +27$

$\qquad 13t = 27$

$\qquad t = \dfrac{27}{13} = 2.076923$

a) It took the car 2.076923 hours to catch up

b) Car traveled $67 \cdot 2.076923 = 139.153846$ miles

**6.** (14pts) Politicians Chapelle, Rock and Silverman are counting their campaigns' funds. Silverman has twice as much as Rock, plus half a milion. Chapelle has exactly as much as the difference of Silverman's and Rocks funds. Together, they have 9 million dollars. How much does each politican have in campaign funds?

$S = 2R + 0.5$

$C = S - R = 2R + 0.5 - R = R + 0.5$

$S + C + R = 9$

$2R + 0.5 + R + 0.5 + R = 9$

$4R + 1 = 9$

$4R = 8$

$R = 2$

$R = 2$ mil

$S = 4.5$ mil

$C = 2.5$ mil