

Solve the inequalities. Write your solution in interval notation.

1. (5pts) $-3 \leq 2x - 3 < 15$ $|+3$

$$0 \leq 2x < 18 \quad | \div 2$$

$$0 \leq x < 9$$

Sol. $[0, 9)$

2. (7pts) $3x - 7 \leq 3$ or $2x + 5 > 16$

$$3x - 7 \leq 3 \quad \text{or} \quad 2x + 5 > 16$$

$$3x \leq 10 \quad 2x > 11$$

$$x \leq \frac{10}{3} \quad x > \frac{11}{2}$$

$$\left(-\infty, \frac{10}{3}\right] \cup \left(\frac{11}{2}, \infty\right)$$

3. (6pts) Find the domain of the function $f(x) = \frac{\sqrt{9-4x}}{3x+2}$ (in interval notation).

Must have

$$9 - 4x \geq 0$$

$$4x \leq 9$$

$$x \leq \frac{9}{4}$$

Can't have:

$$3x + 2 = 0$$

$$3x = -2$$

$$x = -\frac{2}{3}$$

$$\left(-\infty, -\frac{2}{3}\right) \cup \left(-\frac{2}{3}, \frac{9}{4}\right]$$

4. (14pts) Elena, an apparel store employee, can be paid on one of two plans:

A) Salary of \$540 per month, plus a commission of 12% of sales, or

B) Salary of \$820 per month, plus a commission of 7% of sales over \$1,500.

Assuming Elena can always sell more than \$1,500, for what level of sales is plan A better?

$$\text{salary on plan A} \geq \text{salary on plan B} \quad x = \text{amt of sales}$$

$$540 + 0.12x \geq 820 + 0.07(x - 1500)$$

$$540 + 0.12x \geq 820 + 0.07x - 105 \quad | -0.07x - 540$$

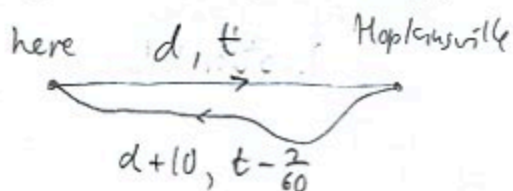
$$0.05x \geq 175$$

$$x \geq \frac{175}{0.05}$$

$$x \geq 3500$$

Plan A is better when sales exceed \$3500

5. (14pts) On a drive to Hopkinsville you take the scenic route and drive at average speed 50 mph. On your return, you take a road that is 10 miles longer, but since you can drive at average speed 60 mph, it takes you 2 minutes shorter than the trip to Hopkinsville. How far is Hopkinsville from your starting point?



d = distance to Hopkinsville (scenic route)
 t = time to Hopkinsville (scenic route)

$$d = 50t$$

$$d+10 = 60\left(t - \frac{2}{60}\right)$$

replace by $50t$

$$50t + 10 = 60t - 2 \quad | +2 - 50t$$

$$12 = 10t$$

$$t = 1.2 \text{ hrs}$$

$$d = 50 \cdot 1.2 = 60 \text{ miles}$$

Distance to Hopkinsville
 using the scenic route is 60 miles

6. (14pts) How many liters of a 4% solution of sulphuric acid must be mixed with how many liters of a 10% solution of sulphuric acid in order to get 5 liters of an 8% solution of sulphuric acid?

$$\begin{array}{|c|} \hline x \\ \hline 4\% \\ \hline \end{array} + \begin{array}{|c|} \hline 5-x \\ \hline 10\% \\ \hline \end{array} = \begin{array}{|c|} \hline 5 \\ \hline 8\% \\ \hline \end{array}$$

x = amt of 4% solution
 $5-x$ = " 10% " "

$$0.04x + 0.10(5-x) = 0.08 \cdot 5$$

$$0.04x + 0.5 - 0.10x = 0.4 \quad | -0.5$$

$$-0.06x = -0.1$$

$$x = \frac{-0.1}{-0.06} = 1.666667 = \frac{5}{3} \text{ liters}$$

Need $\frac{5}{3} = 1.666667$ liters of 4% sol

$\frac{10}{3} = 3.333333$ liters of 10% sol.