1. (18pts) Solve the equations.

$$12 - 5(5 - x) = 3(x + 2) - 11$$

$12 - 25 + 5x = 3x + 6 - 11$

$5x - 13 = 3x - 5 \quad | -3x$

$2x - 13 = -5 \quad | +13$

$2x = 8$

$x = 4$

$$\frac{5x - 11}{x - 6} + 3 = \frac{9}{x - 6} \quad | \cdot (x-6)$$

$\frac{5x-11}{x-6} \cdot (x-6) + 3(x-6) = \frac{9}{x-6} \cdot (x-6)$

$5x - 11 + 3x - 18 = 9$

$8x - 29 = 9 \quad | +29$

$8x = 38 \qquad x = \frac{38}{8} = \frac{19}{4}$

— Since it is not equal to 6, does not produce 0 in denominator, so is a solution

$$LCD = 12$$

$$\frac{x - 3}{3} + \frac{3x + 5}{4} = 2 + \frac{3 - x}{6} \quad \Big| \cdot 12$$

$\frac{x-3}{3} \cdot \overset{4}{12} + \frac{3x+5}{4} \cdot \overset{3}{12} = 24 + \frac{3-x}{6} \cdot \overset{2}{12}$

$4x - 12 + 9x + 15 = 24 + 6 - 2x$

$13x + 3 = 30 - 2x \quad | +2x$

$15x + 3 = 30 \qquad | -3$

$15x = 27$

$x = \frac{27}{15} = \frac{9}{5}$

2. (14pts) You inherit \$13,000 and decide to invest the money in two different investments, one paying 10%, and the other paying 14%. After ~~x~~ six months, your investments are worth \$13,741. How much did you invest in each account?

Total Interest gained = \$741 (13741 - 13000)

x = amount invested @ 10%.

13060 - x = amount invested @ 14%

Interest 1 + Interest 2 = 741

$0.1x \cdot \frac{6}{12} + 0.14 \cdot (13000 - x) \cdot \frac{6}{12} = 741$

↑ ↑ appear because accounts are considered after six months

$0.05x + 0.07(13000 - x) = 741$

$0.05x + 910 - 0.07x = 741 \quad | -910$

$-0.02x = -169$

$x = \frac{-169}{-0.02} = 8450$

Invested \$8450 @ 10%

\$4550 @ 14%

3. (14pts) How many liters of a 10% solution of hydrochloric acid must be mixed with 3 liters of a 24% solution of HCl in order to get a 14% solution?

x = liters of the 10% solution needed

$$\boxed{\begin{array}{c}x\\10\%\end{array}} + \boxed{\begin{array}{c}3\ell\\24\%\end{array}} = \boxed{\begin{array}{c}x+3\\14\%\end{array}}$$

amount of
of pure
acid:

$$0.1x + 0.24\cdot 3 = 0.14(x+3)$$

$$0.1x + 0.72 = 0.14x + 0.42 \quad |-0.1x, -0.42$$

$$0.3 = 0.04x$$

$$x = \frac{0.3}{0.04} = 7.5 \text{ liters}$$

4. (14pts) Fred, who is from Seattle, went to school in Florida. On the way to school, he took a southern route, and on his return after graduation, he took a northern route. On both trips he averaged the same speed. If the southern trek took 52 hours, the northern 60 hours, and the northern trek was 448 miles longer, how long was each trip?

SEATTLE

60 hours, 448 miles larger

FLORIDA

52 hours

Let s = length of southern trip

$$\frac{\text{velocity}}{\text{on northern trip}} = \frac{\text{velocity}}{\text{on southern trip}}$$

$$\frac{s+448}{60} = \frac{s}{52} \qquad |\cdot 52, \cdot 60$$

$$52(s+448) = 60s$$

$$52s + 23296 = 60s \qquad |-52s$$

$$23296 = 8s$$

$$s = \frac{23296}{8} = 2912 \text{ mi southern trip}$$

Alternatively, let v = velocity on each trip
length northern = length southern + 448

$$60\cdot v = 52\cdot v + 448 \qquad |-52v$$

$$8v = 448$$

$$v = \frac{448}{8} = 56 \text{ mi/hr}$$

$$56\cdot 52 = 2912 \text{ southern trip}$$

Northern trip = 2912 + 448 = 3360 mi