

## Problem Set 36

## Solutions Manual

## Problem Set 36

1. First we write the equations.

(36)

(a)  $(P + W)T_D = D_D$

(b)  $(P - W)T_U = D_U$

$P = 4W, T_D = T_U + 1$

Next we use substitution to solve.

Upwind:

(b)  $(P - W)T_U = D_U$

$(4W - W)T_U = 300$

$3WT_U = 300$

$WT_U = 100$

Downwind:

(a)  $(P + W)T_D = D_D$

$(4W + W)(T_U + 1) = 800$

$5WT_U + 5W = 800$

$5(100) + 5W = 800$

$5W = 300$

$W = 60$

$P = 4W = 4(60) = 240$

**Plane = 240 mph; Wind = 60 mph**

2. First write the three equations.

(38)

(a)  $0.20N_W = N_R + 10$

(b)  $\frac{3}{5}N_B = 3N_R$

(c)  $0.10(N_B + N_R) + 94 = N_W$

(a)  $0.20N_W = N_R + 10$

$N_W = 5N_R + 50$

(b)  $\frac{3}{5}N_B = 3N_R$

$N_B = 5N_R$

Now we can use substitution to solve.

(c)  $0.10(N_B + N_R) + 94 = N_W$

$N_B + N_R + 940 = 10N_W$

$N_B + N_R - 10N_W = -940$

$(5N_R) + N_R - 10(5N_R + 50) = -940$

$-44N_R = -440$

$N_R = 10$

$N_W = 5N_R + 50$

$N_B = 5N_R$

$N_W = 5(10) + 50$

$N_B = 5(10)$

$N_W = 100$

$N_B = 50$

3.  $\frac{2}{\sqrt{6}}x = 3\sqrt{2}$

(5,10)

$x = \frac{3\sqrt{12}}{2} = \frac{3 \cdot 2\sqrt{3}}{2} = 3\sqrt{3}$

4. Distance =  $m$ , rate =  $p$ , time =  $\frac{m}{p}$

(28)

New rate =  $\frac{m}{\frac{m}{p} + 2} = \frac{mp}{m + 2p}$  **mi/hr**

5.  $A_1 = l_1w_1$

(35)

$A_2 = l_2w_2 = (1.2l_1)(0.8w_1) = .96l_1w_1 = 0.96A_1$

$A_2 - A_1 = 0.96A_1 - 1.00A_1 = -0.04A_1$

**Decreased by 4%.**

6.  $-3\frac{3}{7} + \frac{2}{9}(C_F - C_I) = -3\frac{3}{7} + \frac{2}{9}\left[4\frac{2}{7} - \left(-3\frac{3}{7}\right)\right]$   
(33)  
 $= -\frac{24}{7} + \frac{2}{9}\left(\frac{30}{7} + \frac{24}{7}\right) = -\frac{24}{7} + \frac{2}{9}\left(\frac{54}{7}\right)$   
 $= -\frac{24}{7} + \frac{12}{7} = -\frac{12}{7}$

7.  $D = \sqrt{(x + 2)^2 + (y - 5)^2}$

(35)

8.  $\sum_{x=3}^5 \frac{3}{x+1} = \frac{3}{3+1} + \frac{3}{4+1} + \frac{3}{5+1}$   
(34)  
 $= \frac{3}{4} + \frac{3}{5} + \frac{1}{2} = \frac{15}{20} + \frac{12}{20} + \frac{10}{20} = \frac{37}{20}$

9. From the graph of the line we pick two ordered pairs: (52, 100) and (54, 80).

(34)

$m = \frac{80 - 100}{54 - 52} = \frac{-20}{2} = -10$

$R = -10W + b$

$100 = -10(52) + b$

$b = 620$

**$R = -10W + 620$**

10.  $f(x) = \sqrt{x}$

(34)

$g(x) = x - 1$