7-2 Day 2

Ex 1) **Airplane Speed**: An airplane flying into a headwind travels the 1800-mile flying distance between Albuquerque, New Mexico and New York City in 3 hours and 36 minutes. On the return flight, the same distance is traveled in 3 hours. Find the airspeed of the plane and the speed of the wind assuming that both remain constant.

$r \cdot t = d$ $\quad \frac{36}{60} = 0.6$

r_1 = airplane speed

r_2 = wind speed

$r_1 + r_2$ = airplane speed w/ wind

$r_1 - r_2$ = airplane speed against wind

$$\begin{cases} \frac{(r_1+r_2)3}{3} = \frac{1800}{3} \\ \frac{(r_1-r_2)3.6}{3.6} = \frac{1800}{3.6} \end{cases}$$

$$\begin{cases} r_1+r_2 = 600 \\ +\ r_1-r_2 = 500 \end{cases}$$

$$\frac{2r_1}{2} = \frac{1100}{2}$$

$r_1 = 550$ mph

$$\frac{(550+r_2)3}{3} = \frac{1800}{3}$$

$550 + r_2 = 600$

$r_2 = 50$ mph

Ex 2) **Investment Portfolio**: A total of $15,000 is invested in two corporate bonds that pay 7.5% and 6% simple interest. The investor wants an annual interest income of $990 from the investments. What is the most that can be invested in the 6% bond?

x = amount at 6%

y = amount at 7.5%

$$\begin{cases} x+y = 15000 \Rightarrow y = 15000 - x \\ 0.06x + 0.075y = 990 \end{cases}$$

$0.06x + 0.075(15000 - x) = 990$

$0.06x + 1125 - 0.075x = 990$

$-0.015x + 1125 = 990$

$-0.015x = -135$

$x = 9000$

Ex 3) **Ticket Sales**: Five hundred tickets were sold for one performance of a play. The tickets for adults and children sold for $7.50 and $4.00, respectively, and the the receipts for the performance totaled $3,312.50. How many of each type of ticket were sold?

a = # of adult tickets

c = # of children tickets

$$\begin{cases} a+c=500 \rightarrow c=500-a \\ 7.5a+4c=3{,}312.5 \end{cases}$$

$7.5a+4(500-a)=3312.50$

$7.5a+2000-4a=3312.50$

$3.5a+2000=3312.50$

$3.5a=1312.50$

$a=375$ adult tickets

$c=500-a$

$c=500-375$

$c=125$ children tickets