

1. Payoff:

$$A = \begin{pmatrix} 1 & 5 & -2 & -1 \\ 0 & -2 & 2 & 0 \\ 0 & 0 & -1 & 1 \end{pmatrix}$$

$$Ap = 0 \rightarrow p = t \begin{pmatrix} -2 \\ 1 \\ 1 \end{pmatrix} \text{ Not a probability vector.}$$

$$A^T = \begin{pmatrix} 1 & 5 & -2 & -1 \\ 0 & -2 & 2 & 0 \\ 0 & 0 & -1 & 1 \end{pmatrix}$$

Arbitrage:

$$-w_1 + w_3 \geq 0$$

$$w_3 \geq w_1 \geq 0$$

$$w_1 \geq \frac{2}{5} w_2$$

$$w_2 \geq w_1 + \frac{1}{2} w_3$$

Eg (1, 2, 1).

2.

$$A = \begin{pmatrix} 2 & 3 & -2 & -1 \\ 0 & -2 & 2 & 0 \\ 0 & 0 & -2 & 1 \end{pmatrix}$$

$$P = \begin{pmatrix} 1 \\ 2 \\ 2 \\ 4 \end{pmatrix}^{1/4}.$$

3.

$$F(0, 3/4) = 70(1.04)^{3/4}$$

$$4. F(1/4, 3/4) = 80(1.04)^{1/2}$$

$$V(1/4) = \{ F(1/4, 3/4) - F(0, 3/4) \} B(1/4, 3/4)$$

$$= \{ 80(1.04)^{1/2} - 70(1.04)^{3/4} \} \frac{1}{(1.04)^{1/2}}$$

$$= 80 - 70(1.04)^{1/4}$$

$$5. X = 60$$

$$V(0) = 70 - 60 \frac{1}{(1.04)^{3/4}}$$

6.

$$F(0, 3/4) = 70 (1.04)^{3/4} - 5 (1.04)^{2/3}$$

7.

$$F(0, 3/4) = 70 \left\{ e^{(-.06)(5/12)} \right\} (1.04)^{15/12}$$

8.

$$F = \left(\frac{1}{6} \right) \frac{(1.01)^{3/2}}{(1.05)^{3/2}} 1200$$

9.

Cost of ₹1200

$$C = \frac{1}{7} 1200$$

Value of contract:

$$V = C - F$$