

Midterm 1, Solutions

February 28, 2009

$$1) P(3H|1st = T, 3rd = H) = \frac{\binom{3}{2} (1/2)^5}{2^3 (1/2)^5} = 3/8.$$

2)

$$P = \begin{pmatrix} 1 & 0 & 0 & 0 \\ .3 & 0 & .7 & 0 \\ 0 & .3 & 0 & .7 \\ 0 & 0 & 0 & 1 \end{pmatrix}.$$

3) a)

$$P = \begin{pmatrix} 2/3 & 1/3 & 0 \\ 2/3 & 0 & 1/3 \\ 0 & 0 & 1 \end{pmatrix}$$

b) $n = 2, i = 0, j = 2$

c) $(1/3)^2$

4) a) Let $u_i = P(X_T = 2 | X_0 = i)$. Then $u_0, u_3 = 0$ and $u_2 = 1$. Also $u_1 = .3u_1 + .5$. Solving we get that $u_1 = 5/7$.

b) The answer is 0 since starting in state one the MC cannot end up in state three.

5) Let V denote the expected earnings. Then $V = (1/3)(4 + V) + (1/2)(6 + V)$. Solving this equation we get that $V = 45/3$.