Tutorial 07 Answers
April 6-7, 2006

1. This is a simple recurrence relation. Let α_k be your expected gain after k rounds. Clearly, we have:

$$\alpha_k = \alpha_{k-1}(2 - 4p + 4p^2) = \alpha_1(2 - 4p + 4p^2)^k$$

and therefore your expected worth after n rounds is:

$$X \cdot (2 - 4p + 4p^2)^{n+1}$$

2. (a) X and Y are not independent.
   (b) Y and Z are independent.
   (c) N/A.
   (d) N/A.

3. (a)

$$M_X(s) = \sum_{k=0}^{78} \binom{78}{k} \left(\frac{1}{2}\right)^k \left(\frac{1}{2}\right)^{78-k} e^{(ks^2/8)+ks}.$$

   (b)

$$M_X(s) = \left(\frac{1}{2} + \frac{1}{2}\left(e^{\frac{s^2}{8}+s}\right)\right)^{78}.$$