Tutorial 11
May 4-5, 2006

1. Problem 5.14 in text, page 306

2. (a) The class {1,2} is recurrent and aperiodic (i.e. the class has period 1). The class {4,5,6} is recurrent with period 3. The state {3} is transient.

   (b) $r_{33}(n) = (0.2)^n$

   (c) Let T_{33} be the number of trials up to and including the first trial on which the process *leaves* state 3, given that it starts in state 3. Then $\mathbf{E}[T_{33}] = \frac{5}{4}$.

   (d) Let X_n denote the state after n trials. Then $\mathbf{P}(X_n \neq 1 \text{ for all } n \mid X_0 = 3) = \frac{3}{8}$.

   (e) $r_{34}(10) = (0.3) + (0.2)^3(0.3) + (0.2)^6(0.3) + (0.2)^9(0.3) \approx 0.3024$

   (f) $\mathbf{P}(X_1 = 4 \mid X_{10} = 4,\ X_0 = 3) = \frac{0.3}{r_{34}(10)} = 0.992$