## Massachusetts Institute of Technology

Department of Electrical Engineering & Computer Science

## 6.041/6.431: Probabilistic Systems Analysis (Fall 2002)

## Tutorial 12 Answers

- (a) States 4 and 5 are transient. The class {1,2,3} is recurrent and not periodic. The class {6,7} is recurrent with period 2.
  - (b)  $\pi_1 = \frac{6}{13}$ ,  $\pi_2 = \frac{6}{13}$ ,  $\pi_3 = \frac{1}{13}$
  - (c) Steady-state probabilities do not exist because the class {6,7} is periodic.
  - (d) i.  $P(BFT) = \frac{18}{65}$ ii.  $P(S2|BFT) = \frac{1}{6}$ iii.  $P(BFC) = \frac{7}{13}$

2.

- (a)  $\mathbf{E}(H) = h$ ,  $\sigma_H = \frac{1.5}{\sqrt{n}}$
- (b) n > 22500
- (c) n >= 90,000
- (d) As was shown in G1 of Problem Set 5, if a random variable X only takes on values between 0 and some c (c > 0), then  $var(X) \le \frac{c^2}{4}$ . Therefore  $\sigma_x \le \frac{c}{2}$ . In this problem c = 3, and therefore the standard deviation of the heights of Canadians is less than or equal to 1.5.
- 3. Practice Problem:
  - (a) Yes, 0
  - (b) No
  - (c) Yes, 0