PROBABILITY & STATISTICS — TEST\ASSIGNMENT - 5

Instructor: Girish Varma • Course Code: MA6.101 • IIIT Hyderabad — 5 marks

1 Inheritance of Job

A man could be a professional, skilled laborer, or unskilled laborer based on his job. It is found that if a man is professional, his son could be a professional 70% times, skilled laborers 20% times, and unskilled laborers 10% times. For skilled laborers, the job statistics of their sons are, 50% skilled laborers, 30% professional, and 20% are unskilled. Finally, in the case of unskilled laborers, 50% of the sons are unskilled laborers, and 25% each are in the other two categories. Assume that every man has at least one son, and form a Markov chain by following the profession of a randomly chosen son of a given family through several generations. Set up the matrix of transition probabilities. Find the probability that a randomly chosen grandson of an unskilled laborer is a professional man. (1 marks)

2 Kalia's Gamble

Kalia is in jail and has 300 rupees; he can get out on bail if he has 800 rupees. A guard agrees to make a series of bets with him. If Kalia bets A rupees, he wins A rupees with probability .4 and loses A rupees with probability .6. He cannot bet more than what he has. Find the probability that he wins 800 rupees before losing all of his money if

1. He bets 100 rupees each time (timid strategy). (1 mark)
2. He bets, each time, as much as possible but not more than necessary to bring his fortune up to 800 rupees (bold strategy). (1 marks)

3 Tennis Game

Suppose players A and B are playing a game of tennis. The game scores are in deuce. If a player wins the next point, he has advantage. On the following point, he either wins the game or the game returns to deuce. Assume that for any point, player A has probability .6 of winning the point and player B has probability .4 of winning the point.

1. Define a Markov Chain and use it to calculate the probability of winning of each player. (1 marks)
2. Find the expected duration of the game. (1 marks)