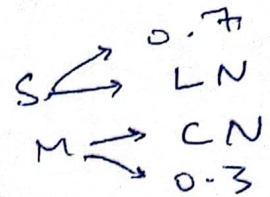# MTH 201: QUIZ 1

Total: 100 points

1) A random kidney patient has a serious ailment with probability 0.2 and a moderate ailment with probability 0.8. We have two kinds of nephrologists, those that treat with laser (LN) and those that treat conservatively only with medicine (CN). A serious patient approaches a LN with probability 0.7 and otherwise approaches a CN. A patient with moderate ailment approaches with equal probability a LN or a CN.

A serious patient who approaches a LN is accepted by the LN with probability 0.8 and with probability 0.2 the patient remains without a doctor. Once accepted by a LN, a serious patient has a probability of 0.6 of a successful treatment and 0.4 of a failed treatment.

A serious patient who approaches a CN is accepted by a CN with probability 0.3 and with probability 0.7 the patient remains without a doctor. Once accepted by a CN, a serious patient has a probability of 0.6 of a successful treatment and 0.4 of a failed treatment.

A patient with moderate ailment is accepted by whichever doctor the patient approaches with probability 1. Once accepted by a doctor (LN or CN), a moderately ill patient has a probability 0.8 of a successful treatment and 0.2 of a failed treatment (for both LN and CN).

Draw the tree diagram.

Derive the probability that a patient is accepted by a LN, given that the patient is a serious patient and had a successful treatment.

Derive the probability that a patient, accepted by a CN, has a successful treatment.

Derive the probability that a patient, accepted by a LN, has a successful treatment.

[50 points]

2) In a game of gambling a player throws a fair coin twice. The player wins 1 dollar if he throws two heads in succession, otherwise he loses two quarters. If the game is repeated 50 times, what is the probability that the net gain or loss is atleast (a) 1 dollar? (b) 5 dollars? (Wherever necessary, you can express your answer as a sum of finite number of terms)

[25 points]

3) Two players A and B agree to play a series of games on the condition that A wins the series if he succeeds in winning m games before B wins n games. The probability of winning a single game is p for A and $q = 1 - p$ for B. What is the probability that A will win the series? (You can express the answer as a sum of finite number of terms.)

[25 points]