

Markov Homework

1. Suppose that today's weather is dependent upon the last two days. If it was sunny yesterday, then it will be sunny tomorrow with probability .7. If it was rainy for the past two days, then there is a 50% chance of rain tomorrow. If it has only rained for only 1 day, then there is a 40% chance of rain tomorrow.

If the Wed and Thursday are both rainy, what is the probability that Saturday and Sunday will both be sunny?

What percent of weekends have both sunny or both rainy days.

Assume that you are hosting an outdoor volleyball tournament. If both days are rainy, you will lose \$1000. If both days are sunny, you will gain \$2000, if either day is sunny, you will gain \$200. What is your expected payoff for the volleyball tournament.

2. A machine produces great, good or defective set of parts. If a defective set of parts is produced, then the process is stopped for the time it takes to create one set of parts and the machine is readjusted during this time. When the machine is back up and running the next set will be good and great with equal probability. If the machine produced a great set of parts, then the machine is equally likely to produce either a good set or a great set next. If the machine produces a good set of parts, then it will produce a good set 70% and a bad set 30% of the time.

What porportion of time is the machine getting reset?

If a great set of parts is worth \$300, and a good set is worth \$250. A defective set is worth \$100 with probability .3 and \$50 with probability .7. Resetting the machine costs \$300. What is the expected payoff per time unit?

3. A fastfood place in the mall has its service times $\text{expo}(30)$ distributed per hour. The interarrival times are exponetially distributed at a rate of 40 per hour. Many arrivals balk according to the number in line as follows.

Number in line	% that balk.
0	0
1	25%
2	50%
3	75%
4	100%.

If the value of a balk is worth \$1, do you think that it is worth adding a second set of workers?

4. A drive up bank has 3 tellers and location for 1 car to be waiting. If the service rates are $\text{expo}(20)$ and the interarrival times are $\text{expo}(40)$ (both in hours), then what is the average number in the system, and how many people balk in an 8 hour day?