

IE-231 In-Class Activity - Week 4

Due Date Mar 7, 2017, 14:00

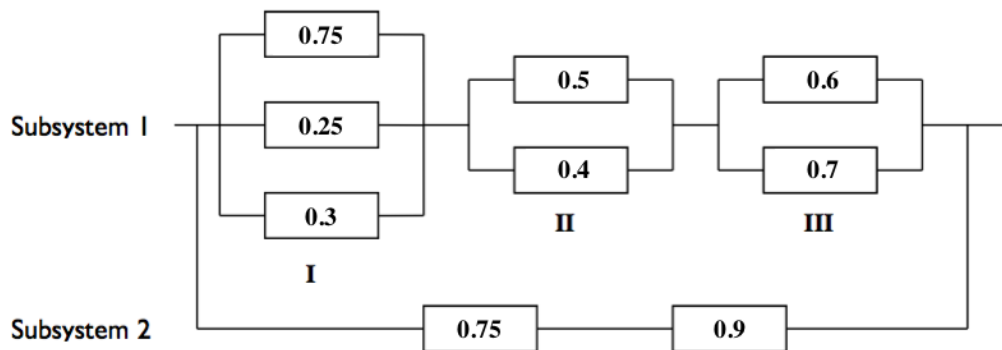
This is a graded in-class assignment. Show all your work in R Markdown files. Submit compiled Word files only.

Question 1

The local coffee shop has three kinds of coffee, Turkish, espresso and filter coffee. A customer orders Turkish coffee with probability 0.4, espresso 0.25 and filter coffee 0.35.

- What is the probability that at least three customers among first 10 customers order espresso or filter coffee?
- What is the probability that the first espresso is ordered by the fourth customer or before?
- The first 7 customers get a free cookie each day. What is the probability that at least three cookies are given to customers who order filter coffee?
- If any type of coffee runs out, the remaining coffee types will be preferred proportionally (e.g. if espresso runs out Turkish coffee's probability will be $0.4/(0.75)$). Suppose, the coffee shop has only 1 cup of espresso left. What is the probability that 3 out of the first 5 customers will order filter coffee?

Question 2



Consider the system above. Suppose the system works if either subsystem 1 or subsystem 2 works. Calculate the probability of the system working?

Question 3

A machine produces 15 items, 12 of which is non-defective. The items are randomly selected without replacement. The sixth selected item is found to be non-defective. What is the probability that this is the third non-defective one?

Question 4

A dice player rolls two dice.

- He wins if the sum is either 7 or 11.
- He loses if the sum is 2, 3 or 12.
- He repeats the roll if the sum is 4, 5, 6, 8, 9 or 10
 - Then repeats the roll until the initial sum is repeated
 - Loses if the sum is 7

What is $P(\text{Win})$? (Hint: $\sum_{i=0}^{\infty} a^i = \frac{1}{1-a}$ if $0 < a < 1$)

Question 5

In a classroom of 22 students, what is the probability that none of them are born on the same day of the year? (ignore February 29)