W03 Homework A

Due date: Thursday 1/29, 11:59pm

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> ✍ **Winning the lottery**
>
> Suppose a lottery game requires that you purchase a $10 game card and advertises a 10% probability of winning a prize.
>
> If you purchase 20 of these game cards, what is the probability you will win at least once?

☑ **Watching the Superbowl**

A representative from Nielsen ratings randomly selects people in Charlottesville, VA and asks them whether they watched the Superbowl. The probability that any individual in Charlottesville watched the Superbowl is 0.3.

(a) What is the probability that if the representative asks 10 people, that less than 2 of them will have watched the Superbowl?
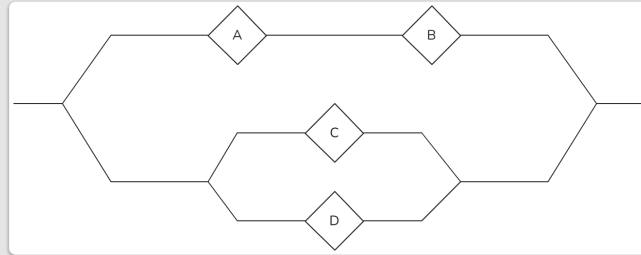
(b) What is the probability that the representative will have to ask at least 3 people to find someone who watched the Superbowl?

✐ Enough staff to open

A small restaurant needs a minimum number of staff to open: 1 manager, 1 cook, 3 servers, and 1 host. Suppose there are 2 managers, 3 cooks, 3 servers, and 1 host. Each staff member is available with probability 0.95, and their availability is independent of others. What is the probability that the restaurant will have enough staff to open?

✏ Reliability of a system

Consider the following system with components that are independent of each other. The probability that each individual component works are as follows: $P[A] = 0.90$, $P[B] = 0.95$, $P[C] = 0.90$, and $P[D] = 0.80$.

What is the probability that the system works?

✒ Patients in the hospital

After being discharged from the hospital following a particular surgery, patients often make visits to their local emergency room for treatment. The function below is the CDF of X, the number of emergency room visits per patient:

$$F_X(x) = \begin{cases} 0 & x < 0 \\ 0.57 & 0 \le x < 1 \\ 0.82 & 1 \le x < 2 \\ 0.97 & 2 \le x < 3 \\ 1 & 3 \le x \end{cases}$$

(a) Find the probability a patient will make more than 1 visit to the emergency room.

(b) Find the probability a patient will not visit the emergency room.