

**CMPSC 310**  
**Artificial Intelligence**  
**Fall 2021**  
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**Class Exercise Solution**  
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1. How many different 6-place license plates are possible if the first 3 places are to be occupied by letters and the final 3 by numbers?

*Answer:* We have:

$$26 \times 26 \times 26 \times 10 \times 10 \times 10 = 17,760,000.$$

2. You are in a restaurant and ordered 2 dishes. With probability 0.6, you will like the first dish; with probability 0.4, you will like the second dish. With probability 0.3, you will like both of them. What is the probability that you like neither dish? (Hint: calculate the prob. that will like at least one dish, then find the complement, i.e. the prob. of liking neither dish.)

*Answer:* Let  $A_i$  the event: “You like dish  $i$ ”. Then the probability you like at least one is:

$$P(A_1 \cup A_2) = P(A_1) + P(A_2) - P(A_1 \cap A_2) = 0.6 + 0.4 - 0.3 = 0.7.$$

The event that you like neither dish is the complement of liking at least one, so

$$\begin{aligned} P(\text{“you will like neither dish”}) &= P((A_1 \cup A_2)^c) \\ &= 1 - P(A_1 \cup A_2) \\ &= 0.3 \end{aligned}$$

3. The probability that it is Friday and that a student is absent is 0.02. Since there are 5 school days in a week, the probability that a school day is Friday is 0.2. What is the probability that a student is absent given that today is Friday?

*Answer:* We have:

$$P(\text{Absent} | \text{Friday}) = \frac{P(\text{Absent on Friday})}{P(\text{Friday})} = \frac{0.02}{0.2} = 0.1$$

4. You have a box with 3 blue marbles, 2 red marbles, and 4 yellow marbles. You are going to pull out one marble, record its color, put it back in the box and draw another marble. What is the probability of pulling out a red followed by a blue?

*Answer:* We have:  $P(\text{red}) = 2/9$  and  $P(\text{blue} | \text{redfirst}) = P(\text{blue}) = 3/9$ , so

$$P(\text{red} \cap \text{blue}) = P(\text{red}) P(\text{blue} | \text{redfirst}) = \frac{2}{9} \times \frac{3}{9} = \frac{2}{27}.$$

5. Consider the same box of marbles. However, we are going to pull out the first marble, leave it out and then pull out the second marble. What is the probability of pulling out a red marble followed by a blue marble?

*Answer:* We have:  $P(\text{red}) = 2/9$  and  $P(\text{blue} | \text{redfirst}) = 3/8 \neq P(\text{blue})$ , so

$$P(\text{red} \cap \text{blue}) = P(\text{red}) P(\text{blue} | \text{redfirst}) = \frac{2}{9} \times \frac{3}{8} = \frac{1}{12}.$$