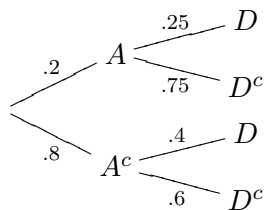


This quiz covers material from section 7.6. Show your work. It is acceptable if you set up but do not compute the answers.

1. (2 points) The accompanying tree diagram represents a two-stage experiment. Use the diagram to find



a. (1 pt)  $P(D|A^c)$

**Answer:** From the tree diagram,

$$P(D|A^c) = .4$$

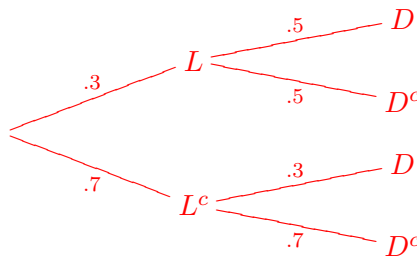
b. (1 pt)  $P(A \cap D^c)$

**Answer:** As discussed in class,

$$P(A \cap D^c) = P(A) \cdot P(D^c|A) = .2 \cdot .75 = .15$$

2. (2 points) The owner of a local ice cream parlor has begun recording the trends of customer purchases. On average, 30% of the customers order low fat ice cream, while the rest order regular ice cream. Of those who order low fat, 50% order a double scoop. Of those who order regular ice cream, 30% order a double scoop. What is the probability that a customer ordered low fat ice cream, given that they ordered a double scoop?

**Answer:** We are given  $P(\text{low}) = .3$ ,  $P(\text{dbl}|\text{low}) = .5$ , and  $P(\text{dbl}|\text{not low}) = .3$ . The completed tree diagram looks like,



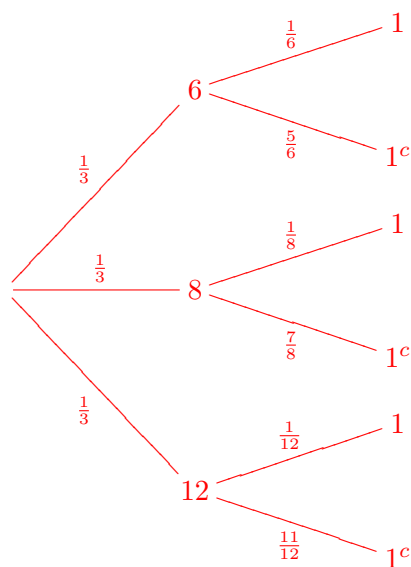
By Bayes' Theorem,

$$P(\text{low}|\text{dbl}) = \frac{P(\text{low}) \cdot P(\text{dbl}|\text{low})}{P(\text{low}) \cdot P(\text{dbl}|\text{low}) + P(\text{not low}) \cdot P(\text{dbl}|\text{not low})} = \frac{.3 \cdot .5}{.3 \cdot .5 + .7 \cdot .3} \approx .42$$

**3.** (4 points) An experiment consists of randomly selecting one of three dice, rolling it, and observing whether the number 1 comes up. The first is a normal six-sided die, the second die is eight-sided (so shows the numbers 1 through 8), the third die is twelve-sided.

**a.** (2 pts) What is the probability that the die that is rolled will come up with the number 1?

**Answer:** The completed tree diagram for this experiment looks like,



Since there are three dice and we are selecting one at random, each has a  $\frac{1}{3}$  chance of being selected. There are three possible ways a 1 could come up—either we select first die and roll a 1, or select the second and roll a 1, or select the third and roll a 1. So,

$$P(1) = \frac{1}{3} \cdot \frac{1}{6} + \frac{1}{3} \cdot \frac{1}{8} + \frac{1}{3} \cdot \frac{1}{12} = .125$$

**b.** (2 pts) If the die rolled shows the number 1, what is the probability that it was the normal six-sided die?

**Answer:** Bayes' Theorem says,

$$P(\text{normal}|1) = \frac{\frac{1}{3} \cdot \frac{1}{6}}{\frac{1}{3} \cdot \frac{1}{6} + \frac{1}{3} \cdot \frac{1}{8} + \frac{1}{3} \cdot \frac{1}{12}} \approx .44$$