

ECEn 370
Quiz #2
September 14, 2012

Name: Solution

A box contains 10 white marbles, 5 yellow marbles, and 10 black marbles.

1. (30 pts) Suppose that a marble is chosen at random and that it is not black. What is the probability that it is yellow?

$$P(Y|B^c) = \frac{P(Y \cap B^c)}{P(B^c)} = \frac{5/25}{15/25} = \frac{5}{15} = \frac{1}{3} = 0.33$$

2. (35 pts) Suppose that 5 of the white marbles and 2 of the yellow marbles are made of glass, while the rest are made of plastic. What is the probability that a randomly selected marble is made of glass?

$$\begin{aligned} P(G) &= P(G|W)P(W) + P(G|Y)P(Y) + P(G|B)P(B) \\ &= \frac{5}{10} \cdot \frac{10}{25} + \frac{2}{5} \cdot \frac{5}{25} + 0 \cdot \frac{10}{25} \\ &= \frac{5}{25} + \frac{2}{25} = \frac{7}{25} = 0.28 \end{aligned}$$

3. (35 pts) If a randomly selected marble is made of glass, what is the probability that it is yellow?

$$\begin{aligned} P(Y|G) &= \frac{P(G|Y)P(Y)}{P(G)} = \frac{\frac{2}{5} \cdot \frac{5}{25}}{\frac{7}{25}} \\ &= \frac{2.5}{7.5} \\ &= \frac{2}{7} \\ &= 0.2857 \end{aligned}$$