

Problems 1 - 6 taken from *Elementary Statistics*, Bluman, 7<sup>th</sup> Edition

1. Use the multinomial formula and find the probabilities for each.

a)  $n = 6, X_1 = 3, X_2 = 2, X_3 = 1, p_1 = 0.5, p_2 = 0.3, p_3 = 0.2$  **0.135**

b)  $n = 5, X_1 = 1, X_2 = 2, X_3 = 2, p_1 = 0.3, p_2 = 0.3, p_3 = 0.1$  **0.0324**

c)  $n = 4, X_1 = 1, X_2 = 1, X_3 = 2, p_1 = 0.8, p_2 = 0.1, p_3 = 0.1$  **0.0096**

d)  $n = 3, X_1 = 1, X_2 = 1, X_3 = 1, p_1 = 0.5, p_2 = 0.3, p_3 = 0.2$  **0.18**

e)  $n = 5, X_1 = 1, X_2 = 3, X_3 = 1, p_1 = 0.7, p_2 = 0.2, p_3 = 0.1$  **0.0112**

3. According to the manufacturer, M&M's are produced and distributed in the following proportions: 13% brown; 13% red; 14% yellow; 16% green; 20% orange; 24% blue. In a random sample of 12 M&M's, what is the probability of having 2 of each color?

**0.0025**

5. A die is rolled 4 times. Find the probability of two 1's, one 2, and one 3.  $\frac{1}{108} \sim$  **0.00923**

6. According to Mendel's theory, if tall and colorful plants are crossed with short and

colorless plants, the corresponding probabilities are  $\frac{9}{16}, \frac{3}{16}, \frac{3}{16},$  and  $\frac{1}{16}$  for tall and

colorful, tall and colorless, short and colorful, and short and colorless, respectively. If 8 plants are selected, find the probability that 1 will be tall and colorful, 3 will be tall and colorless, 3 will be short and colorful, and 1 will be short and colorless. **0.0017**

7. Suppose we have a bowl with 10 marbles - 2 red marbles, 3 green marbles, and 5 blue marbles. We randomly select 4 marbles from the bowl, with replacement. What is the probability of selecting 2 green marbles and 2 blue marbles? **0.135**

8. There are two chess players. The probability that player A will win is 0.40, the probability that player B will win is 0.35, and the probability of a draw is 0.25. If these two chess players played 12 games, what is the probability that Player A would win 7 games, Player B would win 2 games, and the remaining 3 games would be drawn?

$$P(x) = \frac{12!}{7! \cdot 2! \cdot 3!} (.40)^7 (.35)^2 (.25)^3 = 0.0248$$