

MA 202
Spring Semester 2004

WARNING: You must **SHOW ALL OF YOUR WORK**. You will receive NO CREDIT if you do not show your work.

DUE: TUESDAY, 02 MARCH 2004

1. M&M's – Experiment 1

- (a) Each student should select one M&M from his or her bag of M&M's. As a class we have now conducted _____ experiments. Use these experiments to answer the following questions.
- What is the empirical probability of selecting a yellow M&M from a bag of M&M's?
 - What is the empirical probability of selecting a red M&M from a bag of M&M's?
 - What is the empirical probability of selecting an orange M&M from a bag of M&M's?
 - What is the empirical probability of selecting a blue M&M from a bag of M&M's?
 - What is the empirical probability of selecting a brown M&M from a bag of M&M's?
 - What is the empirical probability of selecting a green M&M from a bag of M&M's?
- (b) Each student should replace the M&M he or she selected. Then he or she should select another M&M. As a class we have now conducted _____ experiments. Use these experiments to answer the following questions.
- What is the empirical probability of selecting a yellow M&M from a bag of M&M's?
 - What is the empirical probability of selecting a red M&M from a bag of M&M's?
 - What is the empirical probability of selecting an orange M&M from a bag of M&M's?
 - What is the empirical probability of selecting a blue M&M from a bag of M&M's?
 - What is the empirical probability of selecting a brown M&M from a bag of M&M's?
 - What is the empirical probability of selecting a green M&M from a bag of M&M's?

- (c) Each student should perform the experiment three more times. As a class we have now conducted _____ experiments. Use these experiments to answer the following questions.
- i. What is the empirical probability of selecting a yellow M&M from a bag of M&M's?
 - ii. What is the empirical probability of selecting a red M&M from a bag of M&M's?
 - iii. What is the empirical probability of selecting an orange M&M from a bag of M&M's?
 - iv. What is the empirical probability of selecting a blue M&M from a bag of M&M's?
 - v. What is the empirical probability of selecting a brown M&M from a bag of M&M's?
 - vi. What is the empirical probability of selecting a green M&M from a bag of M&M's?
- (d) Each student should perform the experiment a total of twenty times. As a class we have now conducted _____ experiments. Use these experiments to answer the following questions.
- i. What is the empirical probability of selecting a yellow M&M from a bag of M&M's?
 - ii. What is the empirical probability of selecting a red M&M from a bag of M&M's?
 - iii. What is the empirical probability of selecting an orange M&M from a bag of M&M's?
 - iv. What is the empirical probability of selecting a blue M&M from a bag of M&M's?
 - v. What is the empirical probability of selecting a brown M&M from a bag of M&M's?
 - vi. What is the empirical probability of selecting a green M&M from a bag of M&M's?
- (e) What is the empirical probability of selecting a red M&M or a yellow M&M?
- (f) What is the empirical probability of selecting a red M&M and a yellow M&M? Are these events mutually exclusive.
- (g) The M&M web site contains information on the actual color distribution of M&M's? How do our results compare with this distribution?
- (h) Discuss the Law of Large Numbers in relation to our experiments.

2. M&M's – Experiments 2 and 3

- (a) Experiment 2 – Each student should select two M&M’s from their bag of M&M’s. Be sure to select the M&M’s one at a time. Replace the first M&M before selecting the second.
- i. Conduct this experiment ten times and record your results. (You will conduct ten experiments here. You should replace the M&M’s between each experiment.)
 - ii. What is the empirical probability that the first and second M&M’s you select will be red?
 - iii. What is the empirical probability that the first and second M&M’s a member of this class selects will be red? Are these events independent?
 - iv. What is the empirical probability that the first M&M you select will be blue and second will be green?
 - v. What is the empirical probability that the first M&M a member of this class selects will be blue and second will be green? Are these events independent?
- (b) Experiment 3 – Each student should select two M&M’s from their bag of M&M’s. Be sure to select the M&M’s one at a time. Do not replace the first M&M before selecting the second.
- i. Conduct this experiment ten times and record your results. (You will conduct ten experiments here. You should replace the M&M’s between each experiment. That is, you should select on M&M. Do not replace it. You should then draw a second M&M. Record your results for the first and second M&M’s. Now put both M&M’s back in the bag since you have completed the first experiment. Proceed to conduct the second experiment.)
 - ii. What is the empirical probability that the first and second M&M’s you select will be red?
 - iii. What is the empirical probability that the first and second M&M’s a member of this class selects will be red? Are these events independent?
 - iv. What is the empirical probability that the first M&M you select will be blue and second will be green?
 - v. What is the empirical probability that the first M&M a member of this class selects will be blue and second will be green? Are these events independent?
3. Let A be the event that a person selected at random has blonde hair. Let B be the event that a person selected at random has brown eyes. Are these events independent? Justify your answer.
4. Do numbers 5,6,7,9,14, and 15 in section 10.1 of your textbook.
5. What is The Addition Principle of Counting? Use a Venn diagram to explain this principle.
6. Cards.

- (a) What is the sample space for drawing a card from an ordinary deck of cards?
 - (b) In how many ways can you select a black card or a ten? Are these events mutually exclusive?
 - (c) In how many ways can you select a two or a five? Are these events mutually exclusive?
7. Dice
- (a) What is the sample space for rolling two dice?
 - (b) In how many ways can you roll a seven or five? Are these events mutually exclusive?
 - (c) In how many ways can you roll the dice so that the score is seven or at least one of the dice shows a two? Are these events mutually exclusive?
8. There are twenty-four students in this class.
- (a) In how many ways can we select a President, a Vice President, a Treasurer, and a Secretary for this class?
 - (b) In how many ways can we select a four-member social committee for this class? How is this problem related to the previous problem?
9. Amy, Bailey, and Charles are going to be the 2004 class officers for the Senior Class at Northrop High School. One of them will be the president, another the vice president, and the third will be the treasurer.
- (a) Draw a possibility tree to determine all the possible outcomes for the 2004 class officers.
 - (b) Suppose that Charles cannot be the class Treasurer. Draw a possibility tree to determine all the possible outcomes for the 2004 class officers in this case.
10. Do numbers 1–12, and 15–19 in section 10.2 of your textbook.
11. In the article “The Worlds 10 Worst Dictators” (February 22, 2004), they state that in Equatorial Guinea “the per capita income is \$4500 a year,” but “60% of the people live on less than \$1 a day.” How does this statement relate to our study of statistics? Would say that the mean is always a good indicator of the typical value of a set of data?
12. Do numbers 1–8, 10, 11abc, and 12–15 in section 10.3 of your textbook.
13. Do numbers 18 and 19 in section 10.2 of your textbook.