

Final Review
Module 4, Unit 8 and Unit 9

Directions: Show all work. Round answers to the nearest thousandth unless otherwise indicated.

1. A 110 students were randomly sampled and asked whether they play football. The results of the survey are below.

	Play Football	Don't Play Football	Total
Boys	42	33	75
Girls	12	23	35
Total	54	56	110

- a. What is the probability of randomly selecting an individual that is a boy?

- b. What is the probability of randomly selecting an individual that plays football?

- c. What is the probability of randomly selecting a boy that plays football?

- d. What is the probability of randomly selecting a football player that is a boy?

- e. What is the probability of randomly selecting an individual who is a boy and who plays football?

2. In a school, the probability that a student takes environmental science and geography is 0.25. The probability that student takes environmental science is 0.72 and the probability that a student takes geography is 0.37. What is the probability that a student does not take geography or environmental science? Create a Venn Diagram OR hypothetical 1,000 table to answer the question.

3. According to the U.S. Census Bureau, 19.1% of the U.S. households are in the Northeast. In addition, 4.4% of U.S. households earn \$75,000 per year or more and are located in the Northeast. Determine the probability that a randomly selected U.S. household earns more than \$75,000 per year, given that the household is located in the Northeast. Round to the nearest thousandth.

4. Of voters in a recent election, 48% were female, 59% were Democrat, and 37% were both female and Democrat. Create a hypothetical 1,000 table to answer the questions.
 - a. What is the probability that a voter chosen at random is male?

 - b. What is the probability that a voter chosen at random is either female or Democrat?

 - c. Is being female or Democrat independent of each other?

 - d. If 2000 voters were chosen at random, approximately how many would be male non-Democrats?

5. If two fair dice are rolled, find the probability that the sum of the faces is 7. Leave answers in fraction form.

6. What is the probability of choosing a marble that is not blue from a jar containing 5 red, 6 green, and 4 blue marbles? Leave answer in fraction form.

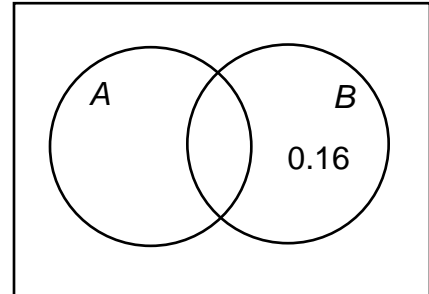
7. Given $P(A) = 0.8$, and $P(B|A) = 0.3$.

a. $P(A \cap B)$

b. $P(B)$

c. $P(A \cup B)$

d. $P(A^c)$



e. $P(B^c)$

f. $P(A^c \cap B^c)$

g. Are A and B disjoint events?
Why or why not?

h. Are A and B independent?
Why or why not?

8. If $P(A) = 0.68$, $P(B) = 0.17$ and A and B are independent, what is $P(A \cap B)$?

9. Suppose that a satellite defense system is established in which four satellites acting independently have a 0.9 probability of detecting an incoming ballistic missile. What is the probability that at least one of the four satellites detects an incoming ballistic missile?

10. The grades of a group of 1000 students in an exam are normally distributed with a mean of 70 and a standard deviation of 10. A student from this group is selected randomly.
- Find the probability that his/her grade is greater than 80.
 - Find the probability that his/her grade is less than 50.
 - Find the probability that his/her grade is between 50 and 90.
 - Approximately, how many students have grades greater than 80?
11. Identify the sampling techniques used in each scenario.
- In order to estimate the percentage of defects in a recent manufacturing batch, a quality control manager at Intel selects every 8th chip that comes off the assembly line starting with the 3rd, until she obtains a sample of 140 chips.
 - In order to determine the average IQ for 9th-grade students, a school psychologist obtains a list of all schools in the local public school system. She randomly selects five of these schools and administers an IQ test to all 9th-grade students at the selected schools.
 - A member of Congress wishes to determine her constituency's opinion regarding estate taxes. She divides her constituency into three income classes: low-income households, middle-income households, and upper-income households. She then takes a random sample of the households from each income class.

- d. In an effort to identify whether an advertising campaign has been effective, a marketing firm conducts a nationwide poll by randomly selecting individuals from a list of known users of the product.

- e. A farmer divides his orchard into 50 subsections, randomly selects 4 and samples all of the trees within the 4 subsections in order to approximate the yield of his orchard.

- f. A survey regarding download time on a certain website is administered on the Internet by a market research firm to anyone who would like to take it.

12. Find the mean, median, range and standard deviation (without Desmos) for the data set below.

13, 15, 17, 14, 10, 15

- a. Calculate the mean
- b. Calculate the median

- c. Calculate the range

- d. Calculate the standard deviation without Desmos. Show all work and round to the nearest hundredth.

13. A distribution of Algebra II/Trig math finals is approximately normal with a mean of 76 and a standard deviation of 6.

a. Use the above information to sketch and label and curve using the Empirical Rule.

b. Find the range of values for the middle 99.7% of the data.

c. What percent of the data is below 64?

d. Your friend's z-score for the test is 1.23. Interpret her z-score in context, then calculate her actual test score.

e. What percent of the data is between 70 and 94?

14. John scored in the 75th percentile on the state math exam. If the mean score is 86 and the standard deviation is 13, what is his actual score?

15. In the absence of special preparation, SAT math scores in recent years have varied normally with a mean of 525 and a standard deviation of 110. One hundred students in Los Angeles County were randomly selected. Half of the students were randomly assigned to take a rigorous training program designed to raise their SAT math scores and half of the students were randomly assigned to group that did not take the course. Their average SAT math score for the students who took the training was 533.7.

a. Is this an example of an experiment or an observational study? How do you know?

- b. If the results are statistically significant, can we conclude that the training leadings to higher SAT math scores? Why or why not?
- c. Can we generalize these findings to all Los Angeles County students? Why or why not?

1a. 0.682 b. 0.491 c. 0.778 d. 0.56 e. 0.382

2. 0.16

3. 0.230

4a. 0.52 b. 0.7 c. No, $P(\text{females}) = 0.48$, $P(\text{Female}|\text{Democrat}) = 0.627$

d. 600

5. $\frac{1}{6}$

6. $\frac{2}{5}$

7a. 0.24 b. 0.4 c. 0.96 d. 0.2 e. 0.6 f. 0.04

g. No, $P(A \cap B) \neq 0$ h. No, $P(B) = 0.4$, $P(B|A) = 0.3$

8. 0.1156

9. 0.9999

10a. 0.1587 b. 0.0288 c. 0.9544 d. 158.7

11a. systematic b. cluster c. stratified d. SRS

e. cluster f. convenience

12a. 14 b. 14.5 c. 7 d. 2.37

13b. 64 – 88 c. 2.5%

d. Your friend's test score is 1.23 standard deviations above the mean.

Actual score: 83.38 e. 83.85%

14. 94.71

15a. It's an experiment because a treatment (course) was assigned.

b. Yes because people were assigned a treatment at random. An experiment allows for a cause-and-effect relationship.

c. Yes because the subjects were randomly selected and randomly assigned.