Problem Set Section 1E

1. Convert each of the following percentages into a proportion. Do not round the answers.

        a) 75%
        b) 2.75%
        c) 0.664%
        d) 0.082%
        e) 39.7%
        f) 8.6%
        g) 0.189%
        h) 0.0025%
        i) 3.16%
        j) 250%
        k) 96.1%
        l) 0.48%
        m) 0.007%
        n) 8.73%
        o) 66.2%
        p) 9%
        q) 100%

2. Convert each of the following proportions into a percentage. Do not round the answers.

        a) 0.057
        b) 0.812
        c) 0.0033
        d) 0.0214
        e) 0.0613
        f) 0.451
        g) 0.00045
        h) 0.0779
        i) 0.046
        j) 0.3161
        k) 0.0027
        l) 0.051
        m) 0.0058
        n) 0.847
        o) 1
        p) 0.00022
        q) 0.0204

(#3-14) Directions: Convert the given percentages into proportions. Then use the following formula to find the estimated amounts. Round your answers to the ones place.

$$Estimated\ Amount = Proportion \times Total$$

3. According to an article by CBS news, approximately 15% of Americans still do not have health insurance. If approximately 78,300 people live in Chino Hills CA, then how many people in Chino Hills would we expect to not have health insurance? Round your answer to the ones place.

4. According to an article online, about 30% of Americans own at least one gun. About 305,700 people live in Stockton CA. If the article was accurate, then approximately how many people in Stockton do we expect to own at least one gun? Round your answer to the ones place.

5. An article by the American Diabetes Association estimates that as of 2012, about 9.3% of Americans have diabetes. College of the Canyons has approximately 18,400 students. If the percentage were correct, how many COC students would we expect to have diabetes? Round your answer to the ones place.

6. According to a news report by www.nielsen.com, about 15.9% of Americans struggle with hunger. Lancaster CA has approximately 161,000 people living in it. If the percentage from the Nielsen report is accurate, then how many people in Lancaster CA may be struggling with hunger? Round your answer to the ones place.

7. According to an article by the Autism Society, about 1.47% of people in the U.S. have autism. The article also stated that the percentage is increasing every year and that Autism is one of the fastest growing disorders in the U.S. Van Nuys, CA has approximately 136,400 people living in it. If the percentage by the Autism Society is correct, how many do we expect to have autism?

8. According to a recent article, about 0.51% of airbags in the U.S. are defective. According to vehicle registration data, there are approximately 1,769,000 cars in San Francisco, CA. How many of them do we expect to have defective airbags?

9. According to a recent U.S. census, about 14.8% of people in the U.S. live below the poverty line. About 305,700 people live in Stockton CA. If the census was accurate, then approximately how many people in Stockton are living in poverty?

10. According to an article by the American Medical Association, approximately 33% of medical doctors in the U.S. have been sued by patients for malpractice. Suppose a hospital has currently 147 doctors on staff. How many of them do we expect to have been sued for malpractice?

(#11-15) Directions: Use the following formulas to calculate the proportions, percentages and the percent of increase. Then answer the given questions.

Decimal Proportion = $\frac{Amount}{Total}$

Percentage = Decimal Proportion × 100%

Percent of Increase = $\frac{(Higher\ Proportion - Lower\ Proportion)}{Lower\ Proportion}$ *× 100%*

11. An article at www.seattletimes.com was addressing the issue of whether women in the U.S. prefer traditional jeans or athletic wear like yoga pants, sweat pants or leggings. Assume that a random sample of 213 total women were asked if they prefer traditional jeans or athletic wear. Assume 139 said they prefer athletic wear and 74 said they prefer traditional jeans. Calculate the decimal proportions and the percentages for both athletic wear and traditional jeans. Then calculate the percentage of increase. Does the percent of increase look statistically significant? Do you think it is practically significant? Explain.

12. The article at www.seattletimes.com also said that jean companies are creating more and more stretchy jeans to compete with the growing trend of women preferring athletic wear. Assume that a random sample of 197 total women were asked if they prefer stretchy jeans or athletic wear. Assume 103 said they prefer athletic wear and 94 said they prefer stretchy jeans. Calculate the decimal proportions and the percentages for both athletic wear and stretchy jeans. Then calculate the percentage of increase. Does the percent of increase look statistically significant? Do you think it is practically significant? Explain.

13. A hospital is trying to decide how to allocate resources to various departments. In particular, they are comparing the medical/surgical ward to the telemetry (heart monitor) ward since these wards have similar costs per patient. Assume we looked at a random sample of patients admitted to the hospital. Of the 350 total patients, 57 were admitted to the medical/surgical ward and 49 were admitted to telemetry. Calculate the decimal proportions and the percentages for both medical/surgical and telemetry. Then calculate the percentage of increase. Does the percent of increase look statistically significant? Do you think it is practically significant? Explain.

14. A company found that of their 348 total employees, 96 employees have health insurance and 252 employees do not have health insurance. Calculate the decimal proportions and the percentages for both having health insurance and not having health insurance. Then calculate the percentage of increase. Does the percent of increase look statistically significant? Do you think it is practically significant? Explain.

15. An experiment was done to test the effectiveness of a new medicine to treat depression. They found that of the 57 people that received the medicine, 13 indicated significant improvement in their depression symptoms. Of the 61 people in the placebo group, 11 indicated significant improvement in their depression symptoms. Calculate the decimal proportions and the percentages for the medicine and placebo groups. Then calculate the percentage of increase. Does the percent of increase look statistically significant? Do you think it is practically significant? Explain.

(#16-20) Directions: Go to www.matt-teachout.org, click on the "statistics" tab and then "data sets". Open the indicated data set and copy the indicated column of categorical data. Go to www.lock5stat.com and click on StatKey. Under the "descriptive statistics and graphs" menu, click on "one categorical variable". Click on the "edit data" button and paste in the column. Check the box for "raw data" and "data has a header row" and push OK. Then answer the questions. Use the following formula for the percent of increase calculation.

Percent of Increase = $\frac{(Higher\ Proportion\ -\ Lower\ Proportion)}{Lower\ Proportion} \times 100\%$

16. Open the "Math 140 Survey Data Fall 2015" at www.matt-teachout.org. Look at the campus data. Use StatKey to make a bar chart, and a summary of the proportions and counts. What proportion of the students went to Valencia? What proportion of the students went to the Canyon Country campus? Calculate the percentage of increase. Does the percent of increase look statistically significant? Do you think it is practically significant? Explain.

17. Open the "Math 140 Survey Data Fall 2015" at www.matt-teachout.org. Look at the gender data. Use StatKey to make a bar chart, and a summary of the proportions and counts. What proportion of the students identified as female? What proportion of the students identified as male? Calculate the percentage of increase. Does the percent of increase look statistically significant? Do you think it is practically significant? Explain.

18. Open the "Math 140 Survey Data Fall 2015" at www.matt-teachout.org. Look at the hair color data. Use StatKey to make a bar chart, and a summary of the proportions and counts. Which hair color had the highest proportion? Which hair color had the lowest proportion?

19. Open the "Math 140 Survey Data Fall 2015" at www.matt-teachout.org. Look at the political part data. Use StatKey to make a bar chart, and a summary of the proportions and counts. What proportion of the students identified as democratic? What proportion of the students identified as republican. Calculate the percentage of increase. Does the percent of increase look statistically significant? Do you think it is practically significant? Explain.

20. Open the "Math 140 Survey Data Fall 2015" at www.matt-teachout.org. Look at the "month of birthday" data. This data has numbers in it. Explain why this is categorical data and not quantitative. Use StatKey to make a bar chart, and a summary of the proportions and counts. Which month had the highest percentage? Which month had the lowest percentage?
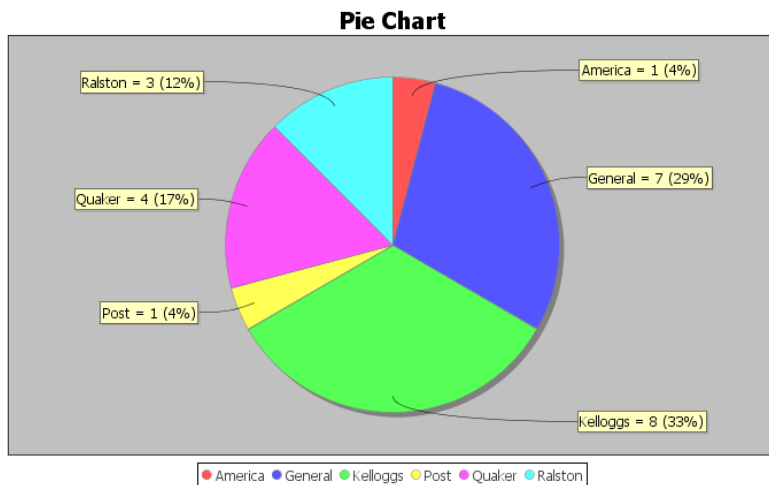
(#21-) Use the pie charts and bar charts provided to answer the following questions. Use the following formula for the percent of increase calculation.

Percent of Increase = $\frac{(Higher\ Proportion\ -\ Lower\ Proportion)}{Lower\ Proportion} \times 100\%$
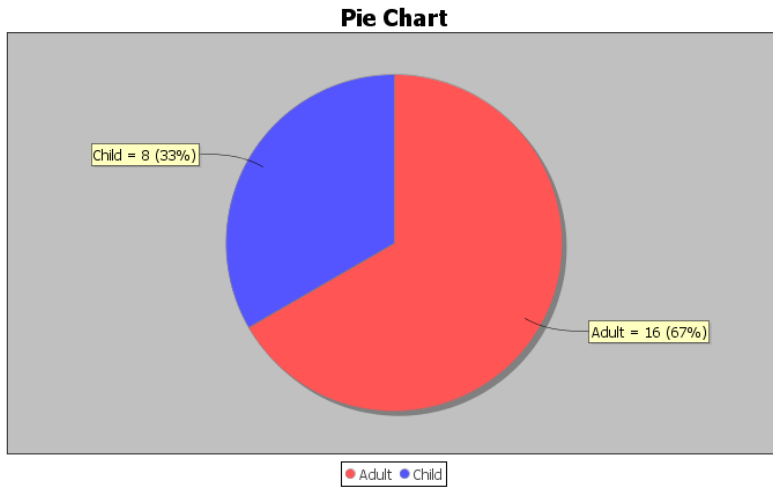
21. The following pie chart was created from the "car data" at www.matt-teachout.org. What percentage of the cars four cylinders? How many of the cars have eight cylinders? What proportion of the cars six cylinders? Calculate the percent of increase to compare four and eight cylinder cars. Does the percent of increase look statistically significant? Do you think it is practically significant? Explain.

Pie Chart

8 = 8 (21%)
4 = 19 (50%)
6 = 10 (26%)
5 = 1 (3%)

● 4 ● 5 ● 6 ○ 8
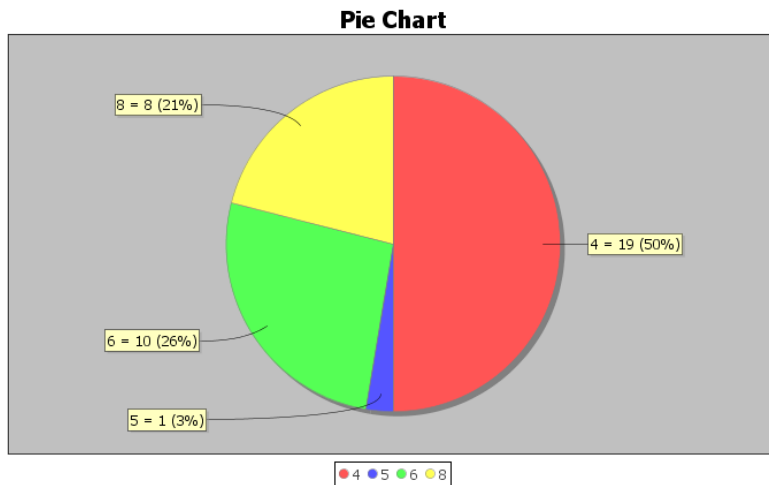
22. The following pie chart was created from the "cereal data" at www.matt-teachout.org. What percentage of the cereals did Quaker make? How many of the cereals did Ralston make? What proportion of the cereals did General make? Calculate the percent of increase to compare Kelloggs and Quaker. Does the percent of increase look statistically significant? Do you think it is practically significant? Explain.

Pie Chart

America = 1 (4%)
Ralston = 3 (12%)
General = 7 (29%)
Quaker = 4 (17%)
Post = 1 (4%)
Kelloggs = 8 (33%)

● America ● General ● Kelloggs ○ Post ● Quaker ● Ralston

23. The following pie chart was created from the "cereal data" at www.matt-teachout.org.   What percentage of the cereals were targeted toward adults? What percentage of the cereals were targeted toward children? Calculate the percent of increase to compare adult cereals and children cereals. Does the percent of increase look statistically significant? Do you think it is practically significant? Explain.

Pie Chart

Child = 8 (33%)

Adult = 16 (67%)

● Adult ● Child

24. The following pie chart was created from the "cereal data" at www.matt-teachout.org.   What percentage of the cereals are displayed on the top shelf? How many of the cereals are displayed on the bottom shelf? What proportion of the cereals are displayed on the middle shelf? Calculate the percent of increase to compare the top and bottom shelf cereals. Does the percent of increase look statistically significant? Do you think it is practically significant? Explain.

Pie Chart

Top = 8 (33%)

Bottom = 8 (33%)

Middle = 8 (33%)

● Bottom ● Middle ● Top
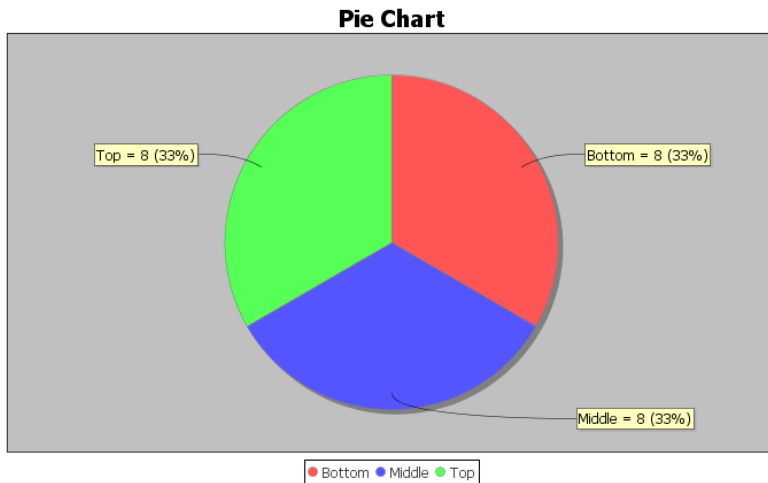
Optional Binomial Probability Questions

(#25) Directions: Go to the following website to access the free binomial probability calculator. Use the program to calculate the following probabilities. (https://stattrek.com/online-calculator/binomial.aspx)

25. To win at a dice game, the player must role two dice and get a 7 or 11 sum. This game has a 22.2% chance of winning. Suppose a player rolls the dice 18 times.

   a) What is the probability that they win exactly once?
   b) What is the probability that they win two times or less?
   c) What is the probability that they do not win at all? (This means she wins zero times.)
   d) What is the probability that they win three times or less?
   e) What is the probability that they win four or more times? (Subtract your answer in (d) from one.)
   f) What is the probability that they win four times or less?
   g) What is the probability that they win five or more times? (Subtract your answer in (f) from one.)

26. A car company thinks that their minivan transmissions have a 12% defective rate. A total of 84 minivans were brought in to a service center this month.

   a) What is the probability that exactly 11 of them need to have their transmission replaced?
   b) What is the probability that exactly 8 of them need to have their transmission replaced?
   c) What is the probability that 12 or less of the minivans will need their transmission replaced?
   d) What is the probability that 13 or more of the minivans will need their transmission replaced?
      (Subtract your answer in (c) from one.)
   e) What is the probability that 6 or less of the minivans will need their transmission replaced?
   f) What is the probability that 7 or more of the minivans will need their transmission replaced?
      (Subtract your answer in (e) from one.)

27. Suppose we take a random sample of 57 total people and ask them if they smoke cigarettes or not. Assume that the population percentage for smoking in the U.S. is 15.5%.

   a) What is the probability that we will get 9 or less people that smoke in the data set?

   b) We need to have at least 10 people in the data set that smoke. What is the probability that we will get 10 or more people that smoke in the data set? (Subtract your answer in part (a) from 1.) Is this percentage high enough for us to be confident that 57 people is a large enough data set? Explain.

28. Suppose we take a random sample of 57 total people and ask them if they smoke cigarettes or not. Assume that the population percentage for non-smokers in the U.S. is 84.5%.

   a) What is the probability that we will get 9 or less people that do not smoke in the data set?

   b) We need to have at least 10 people in the data set that do not smoke. What is the probability that we will get 10 or more people that smoke in the data set? (Subtract your answer in part (a) from 1.)

29. Suppose a person is playing a game of roulette that has a 2.63% probability of winning. The person plays the game forty times.

        a) What is the probability that they do not win at all? (The probability they win zero times.)
        b) What is the probability that they win exactly one time?
        c) What is the probability that they win two or less times?
        d) What is the probability that they win three or more times? (Subtract your answer in (c) from one.)
        e) What is the probability that they win one or less times?
        f) What is the probability that they win two or more times? (Subtract your answer in (e) from one.)

Social Justice Questions

(#30-33) Directions: Convert the given percentages into proportions. Then use the following formula to find the estimated amounts. Round your answers to the ones place.

$$Estimated\ Amount = Proportion\ \times Total$$

30. In the 2015 National School Climate Survey by GLSEN, LGBTQ students from all states in the U.S. were asked a series of questions about their experiences over one year of school. 57.6% of the LGBTQ students said they feel unsafe at school because of their sexual orientation. According to the Williams Institute at UCLA, there is an estimated to be 244,000 LGBTQ students in California between the ages of 13 and 17 years old. If the climate survey is correct, how many of them feel unsafe at school?

31. In the 2015 National School Climate Survey by GLSEN, LGBTQ students from all states in the U.S. were asked a series of questions about their experiences over one year of school. 85.2% of the LGBTQ students said they were verbally harassed (called names or threatened) at school based on a personal characteristic, sexual orientation, or gender expression. According to the Williams Institute at UCLA, there is an estimated to be 1,994,000 LGBTQ students in the U.S. between the ages of 13 and 17 years old. If the climate survey is correct, how many of them have been verbally harassed at school?

32. In the 2015 National School Climate Survey by GLSEN, LGBTQ students from all states in the U.S. were asked a series of questions about their experiences over one year of school. 48.6% of the LGBTQ students said they experienced electronic harassment (cyberbullying) via text messages or postings on social media. According to the Williams Institute at UCLA, there is an estimated to be 114,000 LGBTQ students in Florida between the ages of 13 and 17 years old. If the climate survey is correct, how many of them experienced cyberbullying?

33. In the 2015 National School Climate Survey by GLSEN, LGBTQ students from all states in the U.S. were asked a series of questions about their experiences over one year of school.   13.0% of the LGBTQ students said they were physically assaulted (punched, kicked or injured with a weapon). According to the Williams Institute at UCLA, there is an estimated to be 113,000 LGBTQ students in New York between the ages of 13 and 17 years old. If the climate survey is correct, how many of them were physically assaulted?

(#34) Directions: Use the following formulas to calculate the proportions and the percent of increase. Then answer the given questions.

Decimal Proportion = Percentage ÷ 100

Percent of Increase = $\frac{(Higher\ Proportion\ -\ Lower\ Proportion)}{Lower\ Proportion}$ *× 100%*

34. A computer algorithm called COMPAS (Correctional Offender Management Profiling for Alternative Sanctions) was created by Northpointe, Inc. The algorithm assesses whether defendants have a higher or lower risk of repeating crimes. Judges sometimes use this program when setting bail or jail time. Statisticians analyzed data from 10,000 defendants assessed by the COMPAS program. They determined that 45% of African American defendants were misclassified as high risk, while 23% of white defendants were misclassified as high risk.

   a) What is the percent of increase? Does the percent of increase look high or low?
   b) The amount of defendants assessed was large enough. Does the ratio and percent of increase indicate that the percentage of African American defendants was significantly higher than for white defendants?
   c) What does this data tell us about the use of this program in assessing whether or not a defendant will repeat their crime?

(#35) Directions: Use the bar chart provided to answer the following questions. Use the following formula for the percent of increase calculation.

Percent of Increase = $\frac{(Higher\ Proportion\ -\ Lower\ Proportion)}{Lower\ Proportion}$ *× 100%*

35. In the 2015 National School Climate Survey by GLSEN, over ten-thousand LGBTQ students between the ages of 13 and 21 years old from all 50 states in the U.S. were asked a series of questions. The following bar chart was created from this data.

   a) What percentage of the LGBTQ students were not planning to continue their education due to high victimization against their sexual orientation? What percentage of the LGBTQ students were not planning to continue their education due to lower level victimization against their sexual orientation? Calculate the percent of increase between the high and low victimization. Is there a significant difference in the chances the student quits school?

   b) What percentage of the LGBTQ students were not planning to continue their education due to high victimization against their gender expression? What percentage of the LGBTQ students were not planning to continue their education due to lower level victimization against their gender expression? Calculate the percent of increase between the high and low victimization. Is there a significant difference in the chances the student quits school?

Educational Aspirations and Severity of Victimization (Percentage of LGBTQ Students Not Planning to Pursue Post-Secondary Education)

	Lower Victimization	Higher Victimization
Sexual Orientation	5.4%	9.5%
Gender Expression	5.2%	10.0%