Problem 1

Assume that men’s weights are normally distributed with a mean given by $\mu = 172$ pounds and a standard deviation of 29 pounds.

a) If 1 man is randomly selected, find the probability that his weight is less than 167 pounds.

b) If 36 men are randomly selected, find the probability that they have a mean weight less than 167 pounds.

Problem 2

A population of women have normally distributed weights with a mean of 143 pounds and a standard deviation of 29 pounds.

a) If one woman is randomly selected, find the probability that her weight is between 140 pounds and 211 pounds.
b) If 36 different women are randomly selected, find the probability that their mean weight is between 140 pounds and 211 pounds.

Problem 3

The Rock 'n' Roller Coaster at Disney–MGM Studios in Orlando has two seats in each row. When designing the roller coaster, the total width of the two seats in each row had to be determined. In the “worst case” scenario, both seats are occupied by men. Men have hip breadths that are normally distributed with a mean of 14.4 inches and a standard deviation of 1.0 inches. Assume that two male riders are randomly selected.

Find the probability that their mean hip width is greater than 16 inches.
Problem 4

Women’s weights are normally distributed with a mean of 143 pounds and a standard deviation of 29 pounds, and men’s weights are normally distributed with a mean of 172 pounds and a standard deviation of 29 pounds. You need to design an elevator for the Westport Shopping Center, and it must safely carry 16 people. Assuming a worst case scenario of 16 male passengers, find the maximum total allowable weight if we want a 0.975 probability that this maximum will not be exceeded when 16 males are randomly selected.

Problem 5

In order to monitor the ecological health of the Florida Everglades, various measurements are recorded at different times. The bottom temperatures are recorded at Garfield Bright station and the mean of 30.4°C is obtained for 61 temperatures on 61 different days. Assuming that $\sigma = 1.7^\circ$C, find a 95% confidence interval estimate of the population mean of all such temperatures. What is the interpretation of this interval?
Problem 6

When people smoke, the nicotine they absorb is converted to cotinine, which can be measured. A sample of 40 smokers has a mean cotinine level of 172.5. Assuming that $\sigma$ is known to be 119.5, find a 90% confidence interval estimate of the mean cotinine level of all smokers. What is the interpretation of this interval?

Problem 7

In “The Probable Error of a Mean” by William Gosset published in 1908, the following values were listed for the yields of head corn in pounds per acre.

2009 1915 2011 2463 2180 1925 2122 1482 1542 1443 1535

Using the sample data above, construct a 95% interval estimate of the mean yield.
Problem 8

Because cardiac deaths appear to increase after heavy snowfalls, an experiment was designed to compare cardiac demands of snow shoveling to those using an electric snow thrower. Ten subjects cleared tracts of snow using both methods, and their maximum heart rates (beats per minutes) were recorded during both activities. The following results were obtained:

Manual Snow Shoveling Maximum Heart Rates: $n = 10$, $\bar{x} = 175$, $s = 15$

Electric Snow Thrower Maximum Heart Rates: $n = 10$, $\bar{x} = 124$, $s = 18$

a) Find the 95% confidence interval estimate of the population mean for those people who shovel snow manually.

b) Find the 95% confidence interval estimate of the population mean for those people who use the electric snow thrower.

c) Compare the confidence intervals from parts (a) and (b) and interpret your findings.
Problem 9

When Mendel conducted his famous genetics experiment with peas, one sample of offspring consisted of 705 peas with red flowers and 224 peas with white flowers.

a) Find a 95% confidence interval estimate of the percentage of peas with red flowers.

b) Based on his theory of genetics, Mendel expected that 75% of the offspring peas would have red flowers. Given the percentage of offspring yellow peas is not 75%, do the results contradict Mendel’s theory? Why or why not?

Problem 10

The tobacco industry closely monitors all surveys that involve smoking. One survey showed that among 785 randomly selected subjects who completed four year college, 18.3% smoke. Construct the 98% confidence interval for the true percentage of smokers among all people who completed four years of college.
Problem 11

A study of 420,095 Danish cell phone users found that 135 of them developed cancer of the brain or nervous system. Prior to this study of cell phone use, the rate of such cancer was found to be 0.0340% for those NOT USING cell phones.

a) Use the sample data to construct a 95% confidence interval estimate of the percentage of cell phone users who develop cancer of the brain or nervous system.

b) Do the cell phone users appear to have a rate of cancer of the brain or nervous system that is different from the rate of such cancer among those not using cell phones? Why or why not?