Statistics 101 – Homework 2

Due Wednesday, January 28, 2009

Homework is due on the due date at the end of the lecture.

Reading:  
January 21 – January 23  Chapter 5  
January 26 – January 30  Chapter 6

Assignment:

1. As part of a physiology study participants had their heart rate (beats per minute) taken by a trained nurse practitioner. Below are heart rates for a sample of 20 females.

   70  71  73  71  69  75  77  57  68  68  
   66  76  78  62  77  72  61  74  79  75

   a) Answer the questions, Who? What? for these data.
   b) Make a stem-and-leaf display of the females’ heart rates (use a split stem).
   c) Using the stem-and-leaf display, describe the distribution of heart rates for females. Make sure you mention the shape, center, spread and any outliers or other interesting characteristics of the distribution.
   d) Calculate the sample mean heart rate.
   e) Calculate the sample median heart rate. Why is the sample mean heart rate lower than the sample median heart rate?
   f) Calculate the five number summary for these data.
   g) Given the value \( \sum(y - \bar{y})^2 = 680.95 \), calculate the sample standard deviation for these data.
   h) Which do you think provides a more informative summary of these data; a five number summary or the sample mean and sample standard deviation? Briefly explain your answer.

The heart rates for a sample of 20 males were also taken. On the next page is JMP output for the distribution of female heart rates.

   i) Describe the distribution of heart rates for males. Make sure you mention the shape, center, spread and any outliers or other interesting characteristics of the distribution.
   j) Give the value of the sample mean heart rate. Give the value of the sample median heart rate.
   k) Give the value of the sample standard deviation for male heart rate.
   l) Construct side-by-side box plots (use a common scale) and use these to compare the distribution of females’ and males’ heart rates.
Males’ Heart Rates

<table>
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<tr>
<th>Stem</th>
<th>Leaf</th>
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Heart Rate (bpm)

Five Number Summary

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<tr>
<td>100.0%</td>
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<tr>
<td>75.0%</td>
<td>quartile</td>
<td>75.00</td>
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<tr>
<td>50.0%</td>
<td>median</td>
<td>72.00</td>
</tr>
<tr>
<td>25.0%</td>
<td>quartile</td>
<td>69.25</td>
</tr>
<tr>
<td>0.0%</td>
<td>minimum</td>
<td>64.00</td>
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Statistics

<table>
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<tr>
<th>Statistic</th>
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<tr>
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<tr>
<td>Std Dev</td>
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<td>N</td>
<td>20</td>
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</table>

2. **JMP Assignment**: What is a “normal” body temperature? Researches took the body temperature (degrees Fahrenheit) of 130 adults, 65 males and 65 females. The data are in a file on the course web page. Follow the instructions in the JMP Guide to download the data from the web and open the data in JMP.

a) Obtain a histogram, box plot, stem-and-leaf display and descriptive statistics for the body temperature. **Print the JMP output and turn it in with your assignment.** Use the output to answer the following questions.
   - Describe the distribution of body temperature. Make sure to mention the shape, center, spread and any outliers.
   - What percentage of body temperatures are less than 98.6 degrees Fahrenheit?
   - What is the sample median body temperature? What is the sample mean body temperature?
   - Comment on the relationship between the sample median and sample mean and how this relationship is consistent with your description of the shape of the distribution.

b) Obtain histograms and descriptive statistics for the body temperature by gender. Make sure histograms have common scales. Also obtain side-by-side box plots for males and females. **Print the JMP output and turn it in with your assignment.** Use the output to answer the following questions.
   - Compare males and females in terms of body temperature.