Statistics 2000, Section 001, Quiz 1 (200 Points)
September 28, 2001, Dr. Jürgen Symanzik

Your Name: ______________________

First look at all 4 questions. Then start with the question that looks easiest to you. Continue with a more difficult question. Try to answer as many questions as possible in these 50 minutes.

Note that you will obtain at least partial credit if you indicate a correct formula but your final result is incorrect. If you just rely on your calculator without indicating the formula that should be used and your result is incorrect, you will obtain no credit at all for this part of a question.

**Question 1:** Numbers and Graphs (60 Points)

After Homework 4, we are somewhat suspicious that the circulation of 1.1 million for “Shape” may have been obtained by some manipulation, e.g., by providing free issues as an advertisement. Therefore, we discard this number as an outlier and redo parts of our analysis of the “Weider Empire” magazine circulation based on the following 9 magazines:

<table>
<thead>
<tr>
<th>Magazine Name</th>
<th>Circulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscle &amp; Fitness</td>
<td>450,000</td>
</tr>
<tr>
<td>Living Fit</td>
<td>320,000</td>
</tr>
<tr>
<td>Men’s Fitness</td>
<td>300,000</td>
</tr>
<tr>
<td>Jump</td>
<td>300,000</td>
</tr>
<tr>
<td>Senior Golfer</td>
<td>240,000</td>
</tr>
<tr>
<td>Fit Pregnancy</td>
<td>200,000</td>
</tr>
<tr>
<td>Prime Health &amp; Fitness</td>
<td>175,000</td>
</tr>
<tr>
<td>Flex</td>
<td>150,000</td>
</tr>
<tr>
<td>Shape Cooks</td>
<td>130,000</td>
</tr>
</tbody>
</table>

Please answer the following questions:

1. Determine the mean magazine circulation for the “Weider” empire based on these 9 magazines. (10 Points)

2. Determine the median magazine circulation for the “Weider” empire based on these 9 magazines. (10 Points)
3. Calculate the range, the quartiles, and the interquartile range of the magazine circulation for the “Weider” empire based on these 9 magazines. (10 Points)

4. Indicate the 5 number summary and construct a boxplot based on your results from (3). Make a clear statement whether the data (i.e., the remaining 9 magazines) contains another outlier. (10 Points)

5. Using your results from (3) and (4), is the 1.1 million circulation for “Shape” really an outlier? Explain your answer. (10 Points)

6. We have learned by now that the “Weider” group possesses far more than the 9 magazines listed above. Calculate the variance and make a clear statement whether you are calculating a population or a sample variance. (10 Points)
**Question 2:** Normal Distribution (50 Points)

Part I:
Let $Z$ be a standard Normal variable, i.e., $Z \sim N(0, 1)$, and $X$ be a Normal variable with mean $\mu = 3$ and variance $\sigma^2 = 25$, i.e., $X \sim N(3, 5^2)$. Determine the following:
(5 Points each)

1. $P(Z < -0.54) =$

2. $P(X < -0.54) =$

3. $P(-2.0 < Z < 1.5) =$

4. $P(-2.0 < X < 1.5) =$

5. Find a number $\#$ such that $P(Z > \#) = 0.60$

6. Find a number $\#$ such that $P(X > \#) = 0.60$
Part II:
A college that has an excellent track-and-field athletics program runs short on scholarships and cannot further support all of its 100m track athletes. The athletics director wants to make a decision which athletes to support in the future based on their athletic capabilities. Based on the athletes performance over the last few years, it is known that the distribution of running times is approximately Normal with mean $\mu = 10.8$ sec and standard deviation $\sigma = 0.2$ sec. Answer the following 2 questions:

1. Which qualifying time should the athletics director request such that only 70% of the athletes will be able to achieve this (or a better) time? (10 Points)

2. What are the chances that any athlete from this college will set a new world record of 9.7 sec or better? (10 Points)
Question 3: Newspaper Graphics (40 Points)

The following two graphics have been taken from Wallgren et al. (1996) “Graphing Statistics & Data”.

1. For each of the two graphics, determine if there is something wrong with it. If so, carefully explain what is wrong. (30 Points)

Graphic A:

Graphic B:
2. For each of the graphics from part (1) above that contains something wrong, draw a sketch how a corrected graphic should look like. (10 Points)

Graphic A:

Graphic B:
Question 4: Micromaps (50 Points)

The 2 micromap displays on the next 2 pages have been taken from the U.S. Department of Agriculture, National Agricultural Statistics Service (Research and Development Division) Web site at

http://www.nass.usda.gov/research/gmcrnyap.htm

and


In map A, the states have been arranged from highest to lowest “Acreage” (in millions of acres) and in map B, the states have been arranged from highest to lowest “Yield” (in bushels per acre). Please answer the following questions:

1. Describe each of the 2 micromap displays (in 5 sentences or less) with respect to the variable by which the states have been sorted. (25 Points)

   Map A (by Acreage):

   Map B (by Yield):

   “Acreage” and “Production”:

   “Acreage” and “Yield”: 

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