Name				Student ID#		

AMS 102 ELEMENTS OF STATISTICS   FALL 2008

MIDTERM EXAM 2   NOVEMBER 20

Problem	1	2	3	4	5	Total
Max Score	20	20	20	20	20	100

Problem 1. At the Airport.
(a) In a survey passengers were asked which airline(s) do they fly on a regular basis.
35% chose the answer "I fly Northwest on a regular basis."
42% chose the answer "I fly Continental on a regular basis."
48% chose the answer "I do not fly either Northwest or Continental on a regular basis."
What fraction of passengers flies both Northwest and Continental on a regular basis?

(b) In another survey passengers who flew from New York to Washington were asked which airline they used. The responses were, "United" (40%), "American" (35%), and "Delta" (25%).
When asked if their flight arrived on time 60% of United passengers, 55% of American passengers, and 45% of Delta passengers responded affirmatively.
What fraction of all the questioned passengers arrived on time?

Problem 2. Battery Lifespan

An independent consumer group wants to asses average lifespan of a battery manufactured by a particular company. Previous research done on the batteries of similar type suggest that lifespan of individual batteries has standard deviation $\sigma = 2.5$ hours.

(a) Determine the sample size necessary to obtain a 90% confidence interval for the mean lifespan of a battery with the margin of error of 0.5 hours.

Show all the details of your work, but do not perform any computations.

(b) How would the answer change if a 95% confidence interval would be sought instead?

Problem 3. It's Just Math.

A researcher wishes to investigate the average time it takes fourth graders in the Brookhaven School District to solve a sheet of arithmetic problems correctly.

The researcher randomly selects 40 fourth grade students. She finds that for those students the average time to solve the problems is 12.5 minutes with standard deviation 2.4 minutes.

Construct and interpret a 95% confidence interval for the average number of minutes it takes a fourth grader in the Brookhaven School District to solve the sheet of arithmetic problems correctly.

Show all the details of your work, but do not perform any computations.

Problem 4. Reaction Speed.

A researcher wishes to compare visual reaction speed of men to those of women.

In an experiment 11 males and 14 females were shown a series of images. The subjects had to identify shapes in every image as being "same" or "different." The time to complete the test was recorded for each subject.

The men on average completed the test in 86 seconds with standard deviation 11 seconds.

The women on average completed the test in 92 seconds with standard deviation 14 seconds.

Asses the evidence against the claim "men and women have the same visual reaction speed."

Show all the details of your work. You should be able to perform all the necessary computations.

Problem 5. Statistic in the News.
Results of scientific research utilizing statistics methods occasionally trickles down to the mass media. Journalists are facing the task of explaining these results to the general public. Oftentimes they do a poor job doing so.
Explain what is wrong with the following quotes and correct them if possible.

(a) "The study has shown that conditional probability for a tuberculosis patient to develop a lung cancer is only 2%. That is only 2% of those diagnosed with a lung cancer have also been diagnosed with tuberculosis."

(b) "The average time bacteria can survive in 105° temperature is 42 ± 3 minutes at the confidence level 95%. That is to say, 95% of the bacteria will survive between 39 and 45 minutes.

(c) "The difference in protein content between wild caught and farm raised salmon has been shown statistically significant at the $P = 1.5$ level."