Lab Assignment #5

1. Here are the scores for the Math 338 final exam (last semester).

53	56	56	57	57	59	61	61	63	64	64	74
74	76	76	78	79	84	85	88	88	90	96	
Data Summary: mean = 71.3, standard deviation = 13.16											

(a) According to the Empirical Rule, how many scores should be within 1 standard deviation from the mean?

(b) How many actual scores are within 1 standard deviation from the mean?

(c) According to the Empirical Rule, how many scores should be within 2 standard deviations from the mean?

(d) How many actual scores are within 2 standard deviations from the mean?

(e) Draw a stem plot and describe the distribution whether it is bell-shaped or not. Use {5, 6, 7, 8, 9} as the values in the stem.

(f) Explain why the expected results from the Empirical Rule (parts a and c) and the actual results (parts b and d) are different.

(g) I decided to give everyone some extra credit. So, I raised their scores by 1% (of their own test scores) and then added 2 points. What would be the new mean and the new standard deviation?

2. The distribution of IQ (Intelligence Quotient) scores is bell-shaped with mean 100 and standard deviation 16.

IQ Score	Interpretation
70-79	Cognitively impaired
80-89	Below average intelligence
90-110	Average intelligence
111-120	Above average intelligence
121-130	Gifted
Above 130	Very gifted

(a) What percent of people are gifted and very gifted?

(b) Albert Einstein reportedly had an IQ of 160. Convert his IQ score to a z score.

(c) If we consider "usual IQ scores to be those that fall within 2 standard deviations from the mean. Is Einstein's IQ usual or unusual?

(d) What percent of people have IQ scores as high as Einstein or higher?

3. A line up for tickets to a local concert had a normal distribution with an average (mean) waiting time of 20 minutes with a standard deviation of 4 minutes.

(a) What percentage of the people in line waited for more than 28 minutes?

(b) If 2,000 ticket buyers were in line, how many of them would expect to wait for less than 16 minutes?

4. The life (in km) of a tire has a $N(30000,\ 2000)$ distribution.

(a) What percent of the tires will have a life that exceeds 26,000 km?

(b) If a company purchased 2,000 tires, how many tires would you expect to last more than 28,000 km?

5. A bottle of fruit punch contains at least 473 ml. The machine that fills the bottles is set so that the mean amount of punch is 477 ml. The amounts in the bottles are normally distributed.

(a) What percent of the bottles are under-filled if the standard deviation is 2 ml?

(b) What percent of the bottles are under-filled if the standard deviation is 4 ml?

(c) If we want to have only 0.5% (i.e. 0.005) of the bottles are under-filled, what should be the standard deviation?