Homework #1

Due: Tuesday, September 28 @ 5pm

Problem 1:

Consider the following figure from Kim, Chung, & Shin. "Higher levels of serum triglyceride and dietary carbohydrate intake are associated with smaller LDL particle size in healthy Korean women." *Nutr Res Pract.* 6(2), 2012. (http://www.ncbi.nlm.nih.gov/pubmed/22586500)

- Is this figure a histogram? Justify your answer.
- Describe in words what this figure shows and give your interpretation of it.
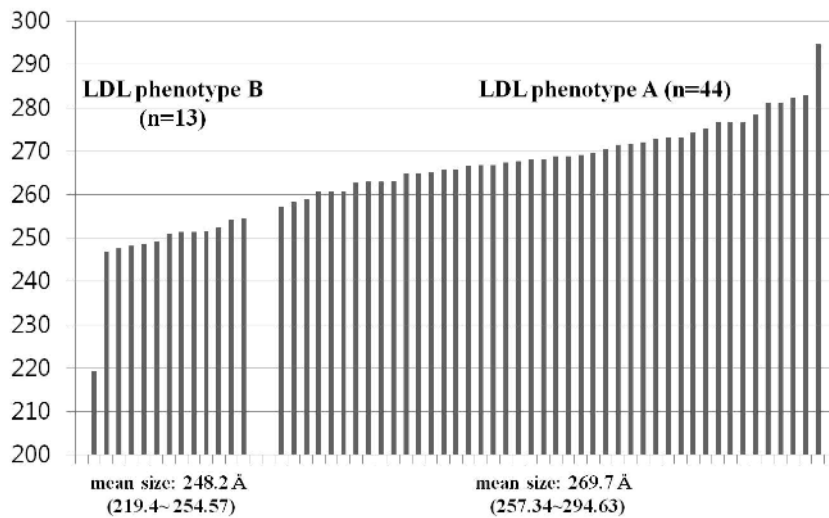- How would you improve this figure? Sketch an improved version.

Fig. 1. Distribution of low-density lipoprotein (LDL) particle size in all study subjects (LDL phenotypes A and B). *LDL phenotype A group* (mean size: 269.7 Å, n = 44), subjects with buoyant-mode profiles [peak LDL particle diameter ≥ 264 Å] including intermediate LDL subclass pattern [256 Å ≤ peak LDL particle diameter ≤ 263 Å]; *LDL phenotype B group* (mean size: 248.2 Å, n = 13), subjects with dense-mode profiles [peak LDL particle diameter ≤ 255 Å]

Problem 2:

Consider the following set of measurements of some variable x

52	16	180	1	199	8	3	23	156	63
808	25	5	554	85	1	64	52	7	192

Using a handheld calculator, compute:

- The mean of x
- The median of x
- The sample standard deviation of x

Sketch:

- A rough histogram of x
- A rough boxplot of x and describe the shape of the distribution in words.

Suppose we added two additional observations to x, both of which were exactly equal to the mean of x.

- What would the new mean be?
- What would the new median be?
- What would the new sample SD be?

Problem 3:

Suppose x is a *sample of body temperatures in Fahrenheit* from patients admitted to the ER in the past month. Let y be that same set of measurements, but converted to Celsius.

- Write down the equation for obtaining y as a function of x.
- If $\bar{x}$ is the mean of the Fahrenheit measurements, what would the mean of the Celsius measurements $\bar{y}$ be, in terms of $\bar{x}$?
- If s_x is the sample SD of the Fahrenheit measurements, what would the sample SD of the Celsius measurements s_y be, in terms of s_x?

Problem 4:

Consider the following graph showing the relative frequency of an event plotted against the number of independent samples.

- What is the probability of event E? (i.e., `Pr{E}`)? How do you know this is true?
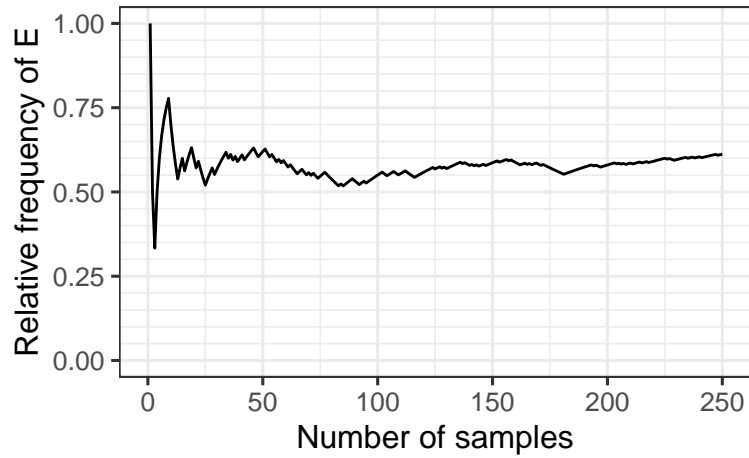
Problem 5:

Consider the following histogram:

- Sketch the corresponding **relative frequency histogram**
- Identify the probability that a chosen value is **less than 4** (i.e., `Pr{ Value < 4 }`)