Name: Key

Due: Monday, March 18
Lab #5 – Math 200 Sp13

***Instructions**: Answer the questions concerning the distributions of men and women's heights in the United States. Show all work in the manner shown in class. If you use a table to give a probability indicate (if not direct table look up, show method of using table via probability notation), if you use a calculator show the input, if you use a formula show the input. Use probability notation. Give probabilities to the correct number of decimals. For binomial probabilities round to the nearest 1000th. For normal probabilities round to the nearest 10,000th.*

Heights of men in the US are normally distributed with the mean of 69.0 inches and standard deviation of 2.8 inches. Heights of women in the US are normally distributed with mean of 63.9 inches and standard deviation 2.5 inches. (As reported by Triola, *Essentials of Statistics*, Ed 4 p. 261)

The following is a sample of heights from students at Cañada College:

Stem-and-Leaf of Heights in Inches

Women		Men
Leaves (x1)	Stem (x10)	Leaves (x1)
1.5 1	6	
3.5 3 3 2	6	
5 4 4 4	6	4
6 6 6 6	6	6 7 7 7
9	6	8 9 9
	7	0 0 0
	7	2 2 2 2
	7	3 4

1. What do you notice about the distribution of women's and men's heights from the stem-and-leaf plot? Comment on shape and make a comparison between the gender's.

Women are shorter than men. The deviation of women is less than that of men, Women have a fairly symmetric shape. Men's heights look potentially bimodal.

2. What is the average height of the men in the Cañada sample?
(Notate correctly. Use your calculator to find the statistic.)

$$\bar{x}_M = \frac{\sum x}{n} = \frac{1182}{17} = 69.52941176 \approx 69.53 \text{ inches}$$

3. What is the average height of the women in the Cañada sample?
(Notate correctly. Use your calculator to find the statistic.)

$$\bar{x}_W = \frac{\sum x}{n} = \frac{964}{15} = 64.2666 \approx 64.27 \text{ inches}$$

For the following questions you must **a)** write the probability that you are finding using correct probability notation, **b)** show standardization of the random variable, **c)** indicate with the use of notation how the answer is found in the negative z-table or show the input into the calculator, **d)** write the probability with correct rounding.

4. What is the probability that an average man's height *in a sample of 17,* that is at least the average height of the men in the Cañada sample, is observed from the population in the US? $\bar{X} \sim N(69.0, 2.8/\sqrt{17})$

$P(\bar{X} \geq 69.53) = P\left(\frac{\bar{X}-\mu}{\sigma/\sqrt{n}} \geq \frac{69.53-69.0}{2.8/\sqrt{17}}\right) = P(Z \geq 0.78)$

$\doteq \boxed{0.2177}$

Table Lookup $P(Z \leq -0.78) = 0.2177$

normalcdf(0.78, E10

5. What is the probability that a randomly chosen male from the US population has a height greater than average height of the men in Cañada sample?

$X \sim N(69, 2.8)$ $P(X > 69.53) = P\left(\frac{X-\mu}{\sigma} > \frac{69.53-69.0}{2.8}\right) = P(Z > 0.19)$

$\doteq \boxed{0.4247}$

Table Lookup $P(Z < -0.19) = 0.4247$

normalcdf(0.19, E10

6. What is the probability that a randomly chosen woman from the US population has a height between 63 and 66 inches? $X \sim (63.9, 2.5)$

$P(63 < X < 66) = P\left(\frac{63-63.9}{2.5} < \frac{X-\mu}{\sigma} < \frac{66-63.9}{2.5}\right)$

$= P(-0.36 < Z < 0.84)$

$= \boxed{0.4401}$

Table Lookup

$[1-P(Z<-0.84)] - P(Z<-0.36)$

$[1-0.2005] - 0.3594 = 0.7995 - 0.3594 = 0.4401$ normalcdf(-0.36, 0.84

7. What is the probability that the average women's height *in a sample of 15*, chosen from the US population, would be between 63 and 66 inches? $\bar{X} \sim N(63.9, 2.5/\sqrt{15})$

$P(63 < \bar{X} < 66) = P\left(\frac{63-63.9}{2.5/\sqrt{15}} < \frac{\bar{X}-\mu}{\sigma/\sqrt{n}} < \frac{66-63.9}{2.5/\sqrt{15}}\right)$

Table Lookup

$[1-P(Z<-3.25)] - P(Z<-1.39)$

$= [1-0.0006] - 0.0823$

$= 0.9994 - 0.0823$

$= \boxed{0.9171}$ * Different due to round-off in table

$= P(-1.39 < Z < 3.25)$

$= \boxed{0.9172}$

normalcdf(-1.39, 3.25)