Name _____

MSDS 6370 Final Exam Part I
Summer 2017, 08/08/2017

1. Select the most suitable answer to each question below (4 points for each):

i) A probability sample is: ____
(a) A sample in which the probability of selection of every individual is the same.
(b) A sample in which the probability of selection of every sample of a given size is the same.
(c) A sample in which the probability of selection of every individual is known and nonzero.
(d) A sample selected from a sampling frame.

ii) The advantage of a probability sample over a non-probability sample is: _____
(a) That its estimates will always be closer to the parameter than those of a non-probability sample.
(b) It is easier to implement and typically costs less.
(c) A measure of uncertainty can be made from a probability sample.
(d) It can be guaranteed to be more representative.

iii) For what reason do sample designers use a stratified sampling design? ____
(a) To reduce the standard error of the estimates of population means and totals.
(b) So that they don't have to know as much about the population in advance.
(c) So that they do not need to obtain a sampling frame.
(d) So that data collection will be cheaper.

2 a). What is the difference between stratified design and cluster design? (2 points)

b) An intern for a telemarketing company is asked to estimate the average amount of successful sales calls made daily per employee for the entire company. There is a total of 8,768 employees in 14 different call centers. The intern can sample the records of 200 employees. Should the intern use a simple random sample or a stratified random sample? Explain (3 points)
(Assume that intern has all the information to conduct SRS and stratified)

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c) A population of people has 4 members: a, b, c, and d. You would like to estimate the proportion of these people who own a dog. Let y = 1 if the person owns a dog and y = 0 if he or she does not. Suppose that a and b own dogs, but c and d do not.

A sample of size 3 is selected based on SRS (without replacement). Calculate the sampling distribution of $\bar{y}$. (10 points)

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3. A simple random sample of 100 students are chosen from the student body of SMU (Assume a student body of 10,000 students). They were each asked the total price of their books for the current semester. A summary of the data from the sample is shown below.

Cost of books	
Mean	341.2969
Standard Error	7.5996
Median	330.3424
Mode	#N/A
Standard Deviation	75.996
Sample Variance	5775.392
Kurtosis	-0.10356
Skewness	0.267759
Range	353.4464
Minimum	189.8438
Maximum	543.2902
Sum	34129.69
Count	100

(a) Construct a 95% confidence interval for the mean price paid for books. (You may use the z-value of 1.96 for the 95% confidence interval). (4 points)

(b) Construct a 95% confidence interval for the total price paid by all students for books. (4 points)

(c) Now suppose that a margin of error of $10 is desired. How large a sample size would be needed to achieve this margin of error? (Show your work.) (5 points)