

### STAT 521: Homework Assignment 3

Due on March 11, 2008

#### Problem 1:

The owners of an exercise facility conducted a study to estimate the average amount of time spent per exercise visit during a 30-day period.

The owners randomly selected 3 days out of the 30 working days using simple random sampling without replacement.

On each of the three sample days, 5 exercise visits were randomly selected using simple random sampling without replacement. The owners recorded the amount of time (in minutes) the exerciser spends during his/her visit to the facility.

The owners also recorded the total number of exercise visits to the facility on each sample day. The data are summarized below.

Day	Total number of customers	Time spent during exercise visit (minutes)					Sum	Sample Mean	Sample variance
		1	2	3	4	5			
1	100	60	40	80	80	50	310	62	320
2	150	20	10	10	40	30	110	22	170
3	75	30	80	30	90	100	330	66	1130
Sum	325						750		

- What is the sample design for this problem? Be specific about each stage of sampling, including the selection method, the sample unit, and the sample size at each stage.
- Estimate the average amount of time spent per visit for the month using ratio estimation method.
- Record the variance formula for the estimator you used in (b). Define the notation used in the formula. DO NOT calculate.
- What is the (unconditional) inclusion probability for a single visit ( $k$ ) in a single day ( $i=3$ )? (I.E. what is  $\pi_{3k} = ?$ )