

AP Statistics – Sampling Procedures Practice (HW #2) – SOLUTIONS TO ODDS

1. **IPHONES** Suppose 1,000 iPhones are produced at a factory today. Management would like to ensure that the phones' display screens meet their quality standards before shipping them to retail stores. Since it takes about 10 minutes to inspect an individual phone's display screen, managers decide to inspect a sample of 20 phones from the day's production.

- a) An eager employee suggests that it would be easy to inspect the last 20 iPhones that were produced today. Why isn't this a good idea?
- b) Another employee recommends inspecting every 50th iPhone that is produced. What type of sampling procedure is this? Explain carefully why this sampling method is not an SRS (simple random sample).

a) It is possible that the quality of the phones changes over the course of the day, so the phones produced at the end of the day may not be representative of the entire day's production.

b) Systematic random sample.
This is not a simple random sample, because in a simple random sample, every possible sample of size 20 must have an equal probability of being selected.

One example (and there are many possible examples):
It is not possible for a sample to contain both the 50th and 51st phones produced that day, because if the 50th phone is selected, then the next phone would be the 100th, then the 150th, and then the 200th, etc.

3. **HIGH-SPEED INTERNET** Laying fiber-optic cable for high-speed internet is an expensive process. Cable companies want to make sure that, if they extend their lines out to less dense suburban or rural areas, there will be sufficient demand and the work will be cost-effective. In the rural town of Podunk, the local cable company decides to conduct a survey to determine the proportion of households in a local subdivision that would buy their internet service. The subdivision has 24 blocks, and each block has exactly 10 households, for a total of 240 households.

- a) Carefully describe a method of randomly selecting 50 households by using a **simple random sample (SRS)**.
- b) For convenience, the cable company may opt to use a cluster sampling method, in which each of the 24 blocks in the subdivision is treated as a cluster. Describe a process for randomly selecting 50 households using a **cluster sampling method**.

a) Assign each household a unique number from 1 – 240. Use a random number generator on a computer or calculator to generate 50 UNIQUE numbers from 1 – 240. The households that had their numbers picked will be selected.

Note: if you use a "random number TABLE", then you MUST use three digit numbers, such as "001 – 240" or "000 – 239". If you use a "random number GENERATOR", then this is not necessary.

b) (Since a cluster involves taking a random sample and then taking a CENSUS of each cluster selected, we need to select 5 blocks, then survey every household in those 5 blocks)

Assign each block a number from 1 – 24, and write those numbers on slips of paper. Place all 24 slips of paper into a hat, and after stirring/mixing, select FIVE numbers (without replacement!).

Every household in the 5 selected blocks will be surveyed, for a total of 50 households.