11-2 Populations and Samples

Objective:

I can find population percentages of a normal distribution (68-95-99.7 rule).

68-95-99.7 Rule

If the data for a population are normally distributed with mean $\bar{x}$ and standard deviation s then,

68% of the data lie between $\bar{x}-1s$ and $\bar{x}+1s$

95% of the data lie between $\bar{x}-2s$ and $\bar{x}+2s$

99.7% of the data lie between $\bar{x}-3s$ and $\bar{x}+3s$

Suppose the heights (in inches) of men ages 20-29 in the United States are normally distributed with a mean of 69.3 inches and a standard deviation of 2.92 inches. Find the following:

a) The percent of men who are between 60.54 inches and 78.06 inches tall.

b) The percent of men who are shorter than 60.54 inches.

A college entrance exam is designed so that scores are normally distributed with a mean of 500 and a standard deviation of 100.

a) What percent of exam scores are between 400 and 600?

b) what is the probability that a randomly chosen exam score is above 600?

c) What is the probability that a randomly chosen exam score is less than 300?

Would a loon chick weighing 95 grams be in the top 2.5%?

79.5	87.5	88.5	89.2	91.6	84.5	82.1	82.3	85.1	89.8
84.0	84.8	88.2	88.2	82.9	89.8	89.2	94.1	88.0	91.1
91.8	87.0	87.7	88.0	85.4	94.4	91.3	86.3	85.7	86.0

Sampling Methods

Simple random: each individual has an equal chance of being selected.

Self-selected: individuals volunteer to be in sample

Convenience: individuals are selected based on accessibility

Systematic: Members of the sample are chosen according to a rule, such as every nth individual

Stratified: population divided into groups and individuals from each group are selected

Cluster: population is divided into groups(some groups randomly selected), and either all the individuals in the groups are selected or just some of the individuals in the groups are selected.

What kind of sampling is this?

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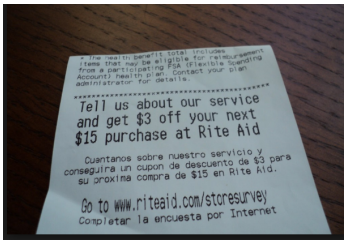

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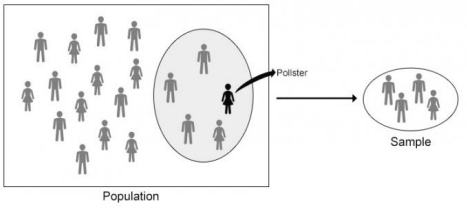

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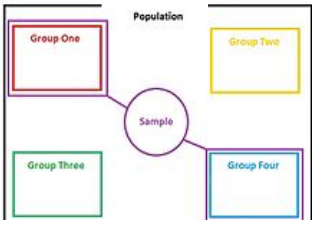

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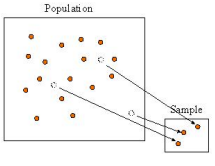

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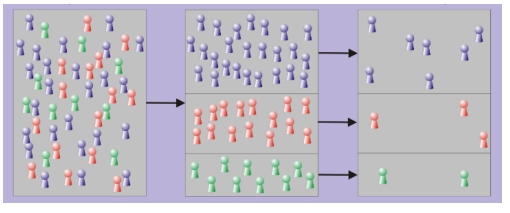

Other sources of bias:

1. Nonresponse: subjects to not respond to the survey

2. Undercoverage: a portion of the population with some commonality is excluded from the survey

3. Voluntary response: the sample chooses itself by responding to a general appeal

4. Response bias: systematic difference between subject's response and the "truth" (i.e. lying)

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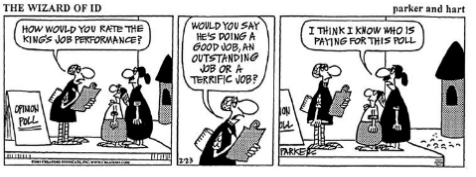

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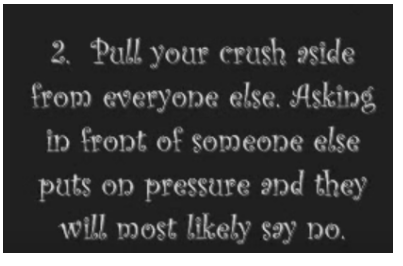

11-2

Identify the population, classify the sampling methods, and decide whether the sampling method could result in a biased sample.

The officials of the NFL want to know how the players feel about some proposed changes to the NFL rules. They decide to ask a sample of 100 players.

a. The officials choose the first 100 players who volunteer their opinions.

b. The officials randomly choose 3 or 4 players from each of the 32 teams.

c. The officials have a computer randomly generate a list of 100 players from a database of all players.

Identify the population, classify the sampling methods, and decide whether the sampling method could result in a biased sample.

Administrators at your school want to know if students think that more vegetarian items should be added to the lunch menu.

a. The administrators survey every 25th student who enters the cafeteria during the lunch period.

b. The administrators survey the first 50 students who get in the lunch line.

c. The administrators use a randomly generated list of 50 students from a master list of all students.