

Math 107

Homework on Statistics

In problems 1-5, identify the sampling method used (simple random sampling, systematic sampling, convenience sampling, stratified sampling) Explain your choice and explain if the sampling method is valid

- 1) An IRS auditor randomly selects for audits taxpayers in each of the filing status categories: single, head of household, married filing jointly and married filing separately. He selects samples from each group in proportion to the actual percentage of filers in each category.
- 2) People magazine chooses its 25 best dressed celebrities by looking at responses from readers who voluntarily mailing a survey printed in the magazine
- 3) Every 100th computer chip that is produced on an assembly line is given a reliability test
- 4) A computer randomly selects 400 names from a list of all registered voters in your state. Those selected are asked about their choice in an upcoming gubernatorial election
- 5) A taste test for chips and salsa is conducted at the entrance to a local market on a Saturday afternoon from 10 a.m. to noon

In problem 6-8, Identify the population being studied and the population parameter of interest, describe the sample statistic for the study. Discuss what additional information you would like to know before you acted on the results of the study

- 6) A study done at the Center for AIDS and STD at the University of Washington tracked the survival rates of 17517 asymptomatic North American Patients with HIV who started drug therapy at different points in the progression of the inflection. It was discovered that asymptomatic patients who postponed antiretroviral treatment until their disease advanced faced a 35% death rate. While those who had initiated drug treatment earlier had only a 15% death rate.
- 7) A Fox News poll of 900 registered voters found that 19% of Americans “regift” (give gifts they received as gifts) Women (21%) are more likely to regift than men (16%) and the results were independent of income. The margin of error was plus or minus 3 points.
- 8) In surveys of 400 households, the pew research center determined that young adults (ages 18-35) had done a better job of shedding debt during the great recession than older adults (over 35). Median debt for young adults fell 29% compared with an 8% reduction for older adults

In problems 9-10, find the confidence interval and answer any additional questions

- 9) A poll is conducted the day before an election for state senator. There are only two candidates running. The poll shows that 53% of the voters surveyed favor the republican candidate with a margin of error of $\pm 2.5\%$ Should the republicans plan a victory party?
- 10) In a CNN poll of 500 adults nationwide, 62% of those surveyed answered yes to the question “Do you favor a law to ban the sale of automatic weapons and semiautomatic rifles/” The margin of error was $\pm 4.4\%$. Would you claim the majority of Americans support such a law?

In problems 11-15, identify at least one potential source of bias in the study. Explain why the bias would or would not affect your view of the study

- 11) An exit poll predicted the winner of an election using interviews with everyone who votes from 7 a.m. to 7:30 a.m.

- 12) In order to determine the opinions of people in the 18-24 year age group on controlling illegal immigration, researcher survey a random sample of 1000 national guard members who are also members of this age group
- 13) An article in the Journal of Nutrition noted that chocolate is rich in Flavonoids. The article reported that regular consumption of Flavonoids may reduce the risk of coronary heart disease. The study was commissioned by Mars Inc., the candy company
- 14) Based on a survey of 2718 people, the national opinion research center concluded that 32% of Americans always make a special effort to sort and recycle glass, cans, plastic and paper and 54% of Americans often make such an effort.
- 15) To gauge public opinion on whether there should be a constitutional amendment to ban flag burning, a survey asked "Do you support the American Flag?"

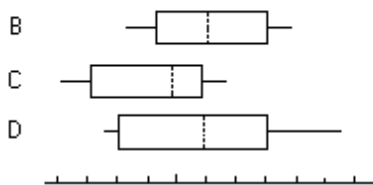
In problem 16, State which type of average, the mean, median, or mode, would be most appropriate in the situation described. Explain your thinking.

- 16) An engineer has designed an elevator and wishes to determine the maximum number of people that will be allowed to ride in the elevator at a time. In order to do this, the engineer needs to know the average weight of the people likely to ride in the elevator.
- 17) Of the mean, median, and mode, which is (are) affected by outliers?

In problem 18, Obtain the mean, mode and five-number summary for the given data. Draw a boxplot

- 18) The National Education Association collects data on the number of years of teaching experience of high-school teachers. A sample taken this year of 19 high-school teachers yielded the following data on number of years of teaching experience.
 33 13 1 20 31
 7 3 11 2 23
 25 1 33 26 4
 16 24 21 3

- 19) Four different distributions are represented by the four boxplots below. Which distribution has the smallest median? Which has the greatest variation?



- 20) Consider the list of test scores given below
 40 46 49 54 56
 62 67 70 73 77
 85 87 90 94 95

Find the mean, median, mode and five number summary