FELLOWSHIP
CHRISTIAN SCHOOL
COLOSSIANS 1: 9-12
EST. 1986

Entering

AP Statistics

Summer Math Packet

Students,

This packet is to be completed by the first day of school and will be used as a study guide for the first assessment in the course. Please show all steps when working through the packet.

It is a mistake to do this packet at the beginning of the summer. We want these techniques to be relatively fresh in your mind in the fall. If you work a couple of problems a day, the whole packet will be completed in no time.

As math department, we hope you take this seriously, as we sincerely wish for you to be successful throughout this next year. Your preparation over the summer will be rewarded in unexpected ways during the year.

Here are some helpful websites to use, if needed:

- http://www.danshuster.com/apstat/APnotes-chap01.pdf will be helpful for some definitions in the packet; make sure for those not listed that you use statistical definitions of the words
- www.khanacademy.org
- www.patrickjmt.com
- www.youtube.com to find specific math related topics with accompanying videos

Sincerely,

Fellowship Math Department

AP Statistics
Summer Packet 2021

For each section, define the terms and then use them to answer the questions.

Section 1: Basic Statistical Terms

Population:

Parameter:

Sample:

Statistic:

EXAMPLE:
100,000 randomly selected US adults were asked whether they drink at least 48 oz of water each day and only 45% said yes. Identify the population and sample.

SOLUTION:
Population: all US adults
Sample: 100,000 randomly selected US adults

Multiple Choice: Choose the one option that best completes the statement or answers the question.

1) A _____ is the complete collection of all measurements or data collected, whereas, a _____ is a subcollection of members selected from the complete collection. 1) _____

   a) Sample; population
   b) Population; parameter
   c) Population; sample
   d) Sample; census

2) A journal publication mails a questionnaire to every college student asking about the quality of its publication. The total number of college students represents what? 2) _____

   a) The population
   b) The sample

3) A private college always mails out a survey three months before enrollment to ask if students if they are going to re-enroll the following year. On average, only 8% of the students responded. Of the 8% who do respond, an average of 85% say that they will re-enroll. This 8% who respond to the survey are known as what? 3) _____

a) The population
b) The sample

4) In a poll of 20,000 randomly selected high school students, 88% answered "yes" when asked, "Do you have Wi-Fi at home?" Identify the sample and population. 4) _____

a) Sample: 88% who answered yes
Population: all high school students
b) Sample: 20,000 selected high school students
Population: all college students
c) Sample: 20,000 selected high school students
Population: 88% who answered yes
d) Sample: all high school students
Population: 20,000 selected high school students

5) An IT security worker wants to test the resolution of some new cameras that the department just received. They received 20 boxes containing 6 cameras each. The worker does not have the time to test every camera in each box. The worker will choose one box at random and test all 6 cameras within that box. What is the population? 5) _____

a) 120 cameras
b) The 6 cameras in the box chosen
c) The one box that was chosen
d) The 20 boxes

6) An IT security worker wants to test the resolution of some new cameras that the department just received. They received 20 boxes containing 6 cameras each. The worker does not have the time to test every camera in each box. The worker will choose one box at random and test all 6 cameras within that box. What is the sample? 6)_____

a) 120 cameras
b) The 6 cameras in the box chosen
c) The one box that was chosen
d) The 20 boxes

7) Spell-checkers on desktop apps don't always catch misspellings or say that a proper name is misspelled when in fact it isn't. John can proofread extremely quickly and is a competent editor. A magazine publisher hires him to check the spelling of every word in the latest proof of a their publication. With regard to John's assignment, what is the population? 7) _____

a) Finding misspellings in the latest proof
b) The total number of misspellings that Jackie finds in the proof
c) Every word in the proof
d) The latest proof of history book

8) Determine whether the following is a statistic or a parameter: 8) _____
A company sampled 30 other companies and found their rate of employees who enrolled in a 401(k) was 47%.

a) Parameter b) Statistic

9) A counselor questions 250 men to determine their age when they first marry. The mean marrying age of the 250 men would be a _____. 9) _____

a) Parameter b) Statistic
c) Population d) Sample

10) The median age of all US First Ladies when their husbands took office would be a _____. 10) _____

a) Parameter b) Statistic
c) Population d) Sample

Short Answer: Complete the following question. Write your answer in complete sentences.

11) Medical researchers are interested in knowing the mean systolic and mean diastolic blood pressures for all US men aged 50 to 60. They sample 3,000 men and measure their blood pressure. They then calculate the mean and standard deviation of both measurements. Do the means and standard deviations represent parameters or statistics? Why?

Section 2: Variables and Individuals

Individuals:

Variable:

Categorical Variables:

Quantitative Variables:

Discrete Variables:

Continuous Variables:

EXAMPLE:
The following is a small section of a data set describing education in the US.

State	Region	Population (1000s)	SAT Verbal	SAT Math	% taking	% No HS
CA	PAC	35,894	499	519	54	18.9
CO	MTN	4,601	551	553	27	11.3
CT	NE	3,504	512	514	84	12.5

Using the distribution, identify the individuals and variables. Determine if each variable is categorical or quantitative.

SOLUTION:
Individuals → states
Variables → Region (C), Population (Q), SAT Verbal (Q), SAT Math (Q), % taking (Q), % No HS (Q)

EXAMPLE:
Determine if each of the following would be a discrete variable or continuous variable

a) Weight of a firefighter
b) Flip a coin 20 times and count the number of heads

SOLUTION:

a) Continuous since a firefighter's weight could take on any value between 0 and infinity
b) Discrete since the number of heads will be an integer value

Multiple Choice: Choose the one option that best completes the statement or answers the question.

12) The US Census collects data about individuals and households. Which variable is categorical? 12) _____

a) Annual electricity cost
b) Type of residence
c) Family size
d) Hours worked per week

13) Which type of data values are quantitative and the number of values is finite or countable? 13) _____

a) Continuous
b) Categorical
c) Interval
d) Discrete

14) Determine whether the given value is from a discrete or continuous data set: The time it takes a calculator to compute 14) _____

a) Continuous
b) Discrete

15) Determine whether the given value is from a discrete or continuous data set: The total number of phone calls made by a sales rep in a month 15) _____

a) Continuous
b) Discrete

16) Determine whether the given value is from a discrete or continuous data set: Speed of cars passing through a busy intersection on a weekday 16) _____

a) Continuous
b) Discrete

Short Answer: Complete the following question. Write your answer in complete sentences.

17) Give two examples of both categorical data and quantitative data that have not already been used in previous examples or problems.

18) The following table gives the top five movies at the box office this week.

Rank	Last week's rank	Movie title	Studio	Box office sales (in millions of $)
1	N/A	Pirate Adventure	Movie Giant	35.2
2	2	Secret Agent Files	GMG	19.5
3	1	Epic Super Hero Team	22nd Century	14.3
4	5	Reptile Ride	Movie Giant	10.1
5	4	Must Love Cats	Dreamboat	9.9

Identify the individuals. Then, identify the variables and state whether they are categorical or quantitative. For each quantitative variable, determine whether it is discrete or continuous.

Section 3: Distributions

For the first four terms, define and draw a rough sketch.

Symmetric:

Uniform:

Right Skewed:

Left Skewed:

Define the following:

Mean:

Median:

Standard deviation:

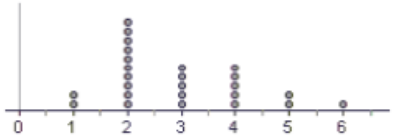
Interquartile Range:

5 number summary:

Range:

Multiple Choice: Choose the one option that best completes the statement or answers the question.

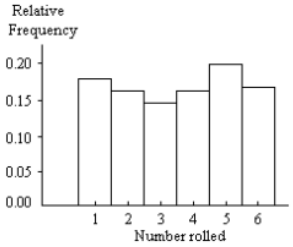
19) The distribution below is the number of people in a household reported by 25 people in a census. 19) _____



The best description for the shape of this distribution is

a) Approximately symmetric
b) Skewed left
c) Skewed right
d) Roughly Uniform

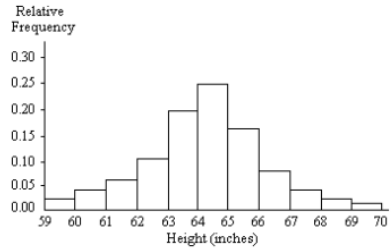
20) A die was rolled 200 times, and the distribution shows the relative frequency (probability) that was obtained for rolling each digit. 20)_____



The best description for the shape of this distribution is

a) Approximately symmetric
b) Skewed left
c) Skewed right
d) Roughly Uniform

21) A relative frequency histogram for the heights of a sample of adult women is shown below. 21)_____



The best description for the shape of this distribution is

a) Approximately symmetric
b) Skewed left
c) Skewed right
d) Roughly Uniform

22) Find the mean for the given data. 22)_____

13, 15, 11, 13, 10

a) 11
b) 15.5
c) 12.4
d) 13

23) Find the median for the given data. 23)_____

3, 7, 18, 21, 30, 30, 49

a) 25.5
b) 18
c) 21
d) 30

24) Find the range for the given data. 24)_____

27, 37, 16, 43, 58

a) 58
b) 10
c) 42
d) 16

25) Find the 5-number summary for the given data. 25)_____

27, 37, 16, 43, 58

a) 16, 26.5, 37, 37, 58
b) 16, 27, 37, 43, 58
c) 16, 21, 37, 21, 58
d) 11, 27, 37, 43, 21

Section 4: Types of Statistics

Descriptive Statistics:

Inferential Statistics:

EXAMPLE:
A news article appearing in a national paper stated that "The fatality rate from use of firearms sank to a record low last year, the government estimated Friday. But the overall number of violent fatalities increased slightly, leading the government to urge an increase in police forces in major urban areas. Overall, 15,600 people died from violent crimes in 2005, up from 15,562 in 2004, according to projections from a government source. Is the figure 15,600 a descriptive statistic or an inferential statistic? Is the figure 15,562 a descriptive statistic or an inferential statistic?

SOLUTION:
The figure 15,600 is an inferential statistic since it is indicated in the statement that it is a projection (probably based on incomplete data for the year 2005). The figure 15,562 is a descriptive statistic since it reflects the actual number of deaths from violent crimes for the year 2004.

Multiple Choice: Choose the one option that best completes the statement or answers the question.

26) A researcher calculates the mean age of 50 randomly selected college students from all over the country and finds the mean of the sample is 20.8 years. Based on the sample, the researcher estimates the average age of all college students to be 20.8 years. How are descriptive and inferential statistics both involved in this scenario? 26)_____

a) When calculating the mean age of the students, the researcher is using descriptive. When estimating the mean age of all college students, the researcher is using inferential.
b) When calculating the mean age of the students, the researcher is using inferential. When estimating the mean age of all college students, the researcher is using descriptive.

27) The table below shows the number of homicides in the US from 2009-2013. 27)_____

Year	Number of homicides
2009	5,048
2010	4,828
2011	4,708
2012	4,787
2013	4,481

Classify this study as descriptive or inferential.

a) Descriptive b) Inferential

28) A researcher studying homicide trends from the study in #27 makes the statement that the number of homicides in the US seems to be decreasing. Is this a descriptive statement or inferential statement? 28)_____

a) Descriptive b) Inferential