

Statistics 151 – Practice Midterm Exam

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Instructions:

1. *Read all the instructions carefully.*
2. *This is a closed book exam.*
3. *You may use the STAT 151 formula sheets and tables provided and a **non-programmable** calculator only.*
4. *You are not to use any scrap paper. There is plenty of blank space for scrap work.*
5. *You have 50 minutes to complete the exam.*
6. *The exam consists of 20 multiple choice questions worth 1 mark each.*
7. *Make sure your name and signature are on this page and that your ID number is on the back of this page.*

Name: _____

Signature: _____

You must return ALL pages of the exam. Missing exam pages will result in a score of 0 and further disciplinary actions may be taken.

IMPORTANT: You must fill in the answers on the answer sheet on the back of this page in the allotted 50 minutes. Failure to do so will result in a penalty of 2 marks. No additional time will be given at the end of the exam to fill it in.

Component	Worth	Mark
Multiple Choice	20	
Final Score	20	

ID: _____

Multiple Choice Answer Sheet:

IMPORTANT: You must fill in the answers on the answer sheet on the back of this page in the allotted 50 minutes. Failure to do so will result in a penalty of 2 marks. No additional time will be given at the end of the exam to fill it in.

Question	Answer
1	B
2	A
3	B
4	D
5	D

Question	Answer
11	D
12	A
13	B
14	D
15	C

6	D
7	B
8	B
9	A
10	C

16	A
17	B
18	B
19	C
20	D

1.

A random sample of data was collected on residential sales in a large city. Blood pressure on average was significantly higher among individuals who lived in houses with more than two bathrooms than individuals who lived in houses with two or fewer bathrooms. What types of inferences can we make?

- a) We can make causal inferences but not population inferences.
- b) We cannot make causal inferences but we can make population inferences.
- c) We can make both causal and population inferences.
- d) We cannot make either causal or population inferences.

2-3: You are playing game. The random variable, Y , represents your possible winnings. The probability distribution of Y is

Y	-3	-2	-1	0	5
$P(Y=y)$	0.25	0.15	?	0.25	0.30

2.

What are the mean and median for winnings, respectively?

- a) 0.4, 0
- b) -1, 0
- c) 0.4, -1
- d) -1, -1

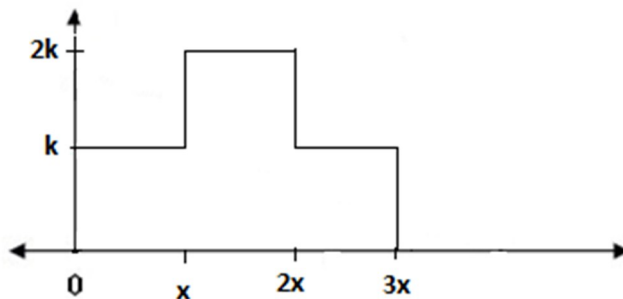
3.

If you play this game 100 times, what is the probability that you win \$5 on at least 35 plays? Note: The probability that you win \$5 on any play is given to be 0.3.

- a) 0.03
- b) 0.14
- c) 0.30
- d) 0.35

4.

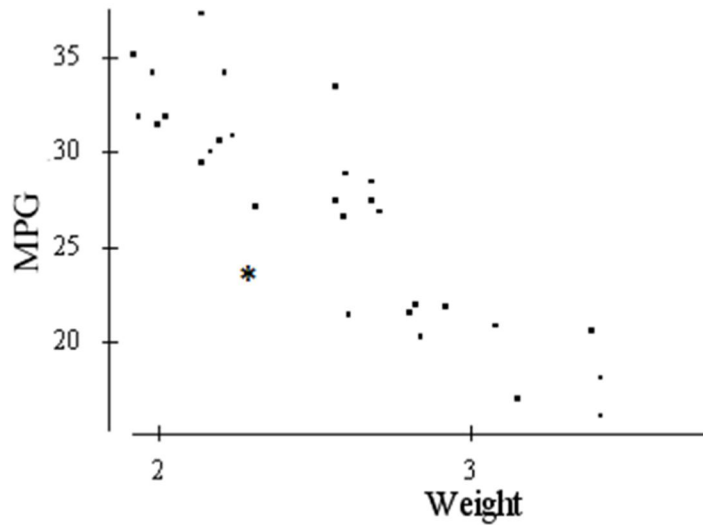
Consider the random variable, Y , with the following density curve (with positive probabilities for Y from 0 to $3x$):



What is the interquartile range of Y ?

- a) $4k$
- b) $4/k$
- c) $k/4$
- d) $1/(4k)$

5. Consider the following scatterplot of gas mileage vs. weight of cars (in thousands of pounds).



Which is true:

- a) The correlation is about 0.7 and the point (*) has a positive residual.
 - b) The correlation is about 0.7 and the point (*) has a negative residual.
 - c) The correlation is about -0.7 and the point (*) has a positive residual.
 - d) The correlation is about -0.7 and the point (*) has a negative residual.
- 6.
- If you guess at random the answer for every question on this test, what is the probability that you will get at least one correct answer?
- a) 0.95
 - b) 0.75
 - c) 0.986
 - d) 0.997
- 7.
- Suppose you have a 2.5 grade point average in 3 courses. What is the minimum average you can have in your fourth and fifth courses to ensure your overall grade point average is at least 3?
- a) 2.25
 - b) 3.75
 - c) 3.5
 - d) 2.75

8-9: For a particular university population the following percentages are reported:

- 45% are Male students
- 35% are Arts students
- 40% are Science students
- 7% are Female students and in Other faculties
- 75% of the students are Male and/or in Arts

8.

What proportion of students are Males and in Arts?

- a) 16% b) 5% c) 80% d) 20%

9.

What proportion of students in other faculties are female?

- a) 28% b) 18% c) 3.6% d) 38%

10.

Consider flipping a (two-sided) coin over and over again. Suppose $p = P(\text{heads})$. What is the probability that the first head is observed on an even flip?

I'll get you started

Define:

E - 1st head is on an even flip (that is, flip 1, 3, 5, 7 etc...)

H_i - flip i is heads

T_i - flip i is tails

$$\begin{aligned} \Rightarrow P(E) &= P(E \cap H_1) + P(E \cap T_1) = P(H_1)P(E | H_1) + P(T_1)P(E | T_1) \\ &= pP(E | H_1) + (1-p)P(E | T_1) \end{aligned}$$

- a) $(3-2p)/6$ b) $1/(2-p)$ c) $(1-p)/(2-p)$ d) $(2p+3)/6$

11.

What is true for a distribution that is skewed left?

- a) The mean is larger than the median and the sum of deviations is negative.
- b) The mean is larger than the median and the sum of deviations is zero.
- c) The mean is less than the median and the sum of deviations is negative.
- d) The mean is less than the median and the sum of deviations is zero.

12-13: The grade point averages of a large population of university students are approximately normally distributed with mean 2.2 and standard deviation 0.6.

12.

If you need to finish in the top 25% of your class to earn a certain scholarship, what must your grade point average be?

- a) 2.605 b) 3.376 c) 1.795 d) 2.441

13.

Suppose that 4 students are randomly selected from the student body. What is the probability their average grade point average is above 3.0? Pick the closest one.

- a) 0.0918 b) 0.0038 c) 0.000071 d) 0.25

14.

A measure calculated from a population to describe one of its characteristics is called

- a) A statistic b) a residual c) an estimate d) a parameter

15-17: A newspaper article reports that in a poll of 120 randomly selected eligible voters, 55% said they will support candidate A in the election. There are only two candidates running.

15.

They report the results accurate within 3%. What confidence level did they use?

- a) 50.92% b) 25.46% c) 49.08% d) 74.54%

16.

What is the margin of error for a 92% confidence interval?

- a) 0.079 b) 0.064 c) 0.089 d) 0.0036

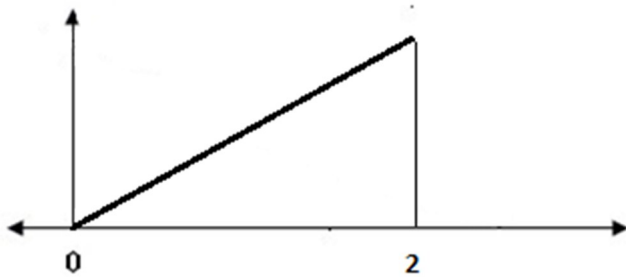
17.

Another newspaper wants to estimate the percent of eligible voters that support candidate A in the election. They want their estimate to be accurate within 2% with, 97% confidence. About how many observations do they need?

- a) 2401 b) 2944 c) 2209 d) 149

18.

Consider the random variable, Y , with the following density curve (with positive probabilities for Y from 0 to 2):



What is the median of Y ?

- a) 1 b) 1.41 c) 0.71 d) 1.21

19-20: A highly respected mathematics department at a large university, accepting thousands of applications, wants to admit only those students who will successfully complete their first year with a GPA of at least 3.0. In order to predict a student's GPA at the end of their first year, the admissions board decides to consider the mathematics portion of the student's SAT score as a predictor (or explanatory) variable. The first year GPA and the SAT math scores were observed for 20 students just completing their first year. The following regression results were obtained:

Parameter estimates:

Parameter	Estimate	Std. Err.	DF	T-Stat	P-Value
Intercept	1.205	0.2166283	18	5.5641947	<0.0001
Slope	0.00318	4.6518366E-4	18	6.832317	<0.0001

Analysis of variance table for regression model:

Source	DF	SS	MS	F-stat	P-value
Model	1	5.301	5.301	46.5	<0.0001
Error	18	2.044	0.114		
Total	19	7.345			

19.

What would a student need on their SAT math score to be accepted if their predicted GPA must be at least 3?

- a) 944 b) 379 c) 565 d) 489

20.

What percentage of variation in GPA is explained the SLR on SAT?

- a) 39% b)28% c) 98% d)72%

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