

MATH225N Week 8 Final Exam

Question 1

Data is collected on the relationship between time spent playing video games and time spent with family. The data is shown in the table and the line of best fit for the data is $\hat{y} = -0.27x + 57.5$. Assume the line of best fit is significant and there is a strong linear relationship between the variables.

Video Games (Minutes)	Time with Family (Minutes)
30	50
60	40
90	35
120	25

According to the line of best fit, the predicted number of minutes spent with family for someone who spent 95 minutes playing video games is 31.85. Is it reasonable to use this line of best fit to make the above prediction?

Ans:

The estimate, a predicted time of 31.85 minutes, is unreliable but reasonable.

The estimate, a predicted time of 31.85 minutes, is both unreliable and unreasonable.

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The estimate, a predicted time of 31.85 minutes, is reliable but unreasonable.

Question 2

Which of the following are feasible equations of a least squares regression line for the annual population change of a small country from the year 2000 to the year 2015? Select all that apply.

Ans:

$\hat{y} = 38,000 + 2500x$

$\hat{y} = 38,000 - 3500x$

$\hat{y} = -38,000 + 2500x$

$\hat{y} = 38,000 - 1500x$

Question 3

To test the effectiveness of a drug proposed to relieve symptoms of headache, physicians included participants for a study. They gave the drug to one group and a drug with no therapeutic effect to another group. Which group receives the placebo?

Ans:

the physicians

the group that received the drug for headache

the group that received the drug with no therapeutic effect

all of the people in the study

Question 4

Becky's statistics teacher was teaching the class how to perform the z-test for a proportion.

Becky was bored because she had already mastered the test, so she decided to see if the coin she had in her pocket would come up heads or tails in a truly random fashion when flipped. She discretely flipped the coin 30 times and got heads 18 times.

Becky conducts a one-proportion hypothesis test at the 5% significance level, to test whether the true proportion of heads is different from 50%.

Which answer choice shows the correct null and alternative hypotheses for this test?

Ans:

$H_0:p=0.6$; $H_a:p>0.6$, which is a right-tailed test.

$H_0:p=0.5$; $H_a:p<0.5$, which is a left-tailed test.

$H_0:p=0.6$; $H_a:p\neq 0.6$, which is a two-tailed test.

$H_0:p=0.5$; $H_a:p\neq 0.5$, which is a two-tailed test.

Question 5

A farmer divided his piece of land into 4 equivalent groups. The quality of the soil is the same across the 4 groups of land. He planted the same crop in all 4 groups of land and recorded the yield of the crop in all 4 groups for a 4 week period. Is the study observational or experimental? If it is an experiment, what is the controlled factor?

Ans:

The study is an observational study.

The study is an experiment. The controlled factor is the 4 week observation period.

The study is an experiment. The controlled factor is the land.

The study is an experiment. The controlled factor is the growth of the crops.

Question 6

The population standard deviation for the heights of dogs, in inches, in a city is 3.7 inches. If we want to be 95% confident that the sample mean is within 2 inches of the true population mean, what is the minimum sample size that can be taken?

$z_{0.10}$	$z_{0.05}$	$z_{0.025}$	$z_{0.01}$	$z_{0.005}$
1.282	1.645	1.960	2.326	2.576

Use the table above for the z-score, and be sure to round up to the nearest integer.

Ans: 14 dog heights

Question 7

Assume the null hypothesis, H_0 , is: Jacob earns enough money to afford a luxury apartment. Find the Type I error in this scenario.

Ans:

Jacob thinks he does not earn enough money to afford the luxury apartment when, in fact, he does.

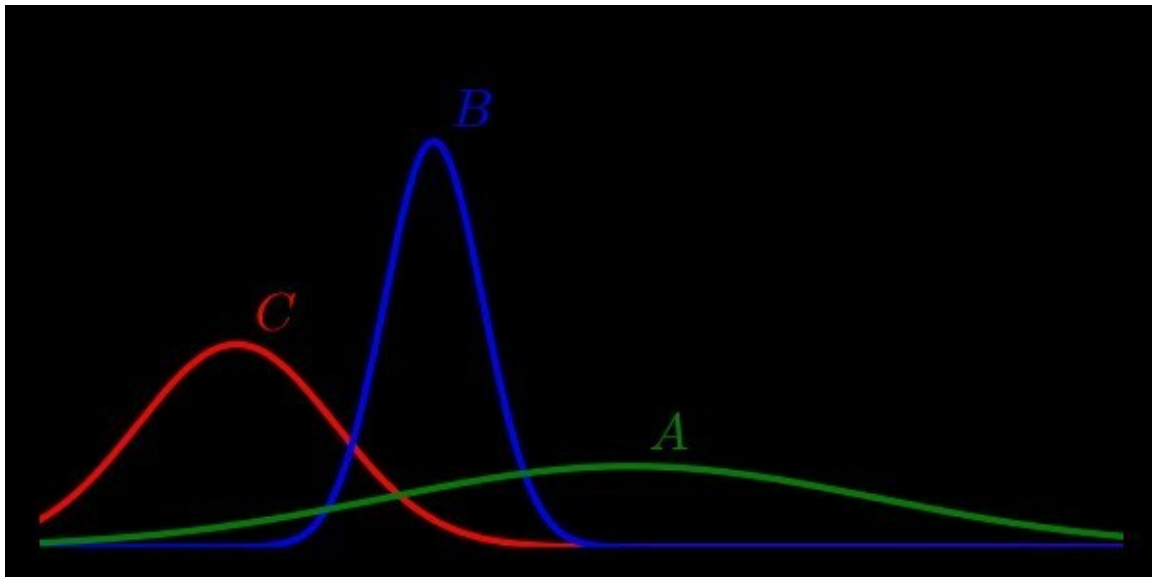
Jacob thinks he does not earn enough money to afford the luxury apartment when, in fact, he does not.

Jacob thinks he earns enough money to afford the luxury apartment when, in fact, he does not.

Jacob thinks he earns enough money to afford the luxury apartment when, in fact, he does.

Question 8

The graph below shows the graphs of several normal distributions, labeled A, B, and C, on the same axis. Determine which normal distribution has the smallest standard deviation.



Ans: **B**

Question 9

A doctor notes her patient's temperature in degrees Fahrenheit every hour to make sure the patient does not get a fever. What is the level of measurement of the data?

Ans:

Nominal

ordinal

Interval

ratio

Question 10

Given the following list of prices (in thousands of dollars) of randomly selected trucks at a car dealership, find the median.

20,46,19,14,42,26,33

Ans: median = 26 thousands of dollars

Question 11

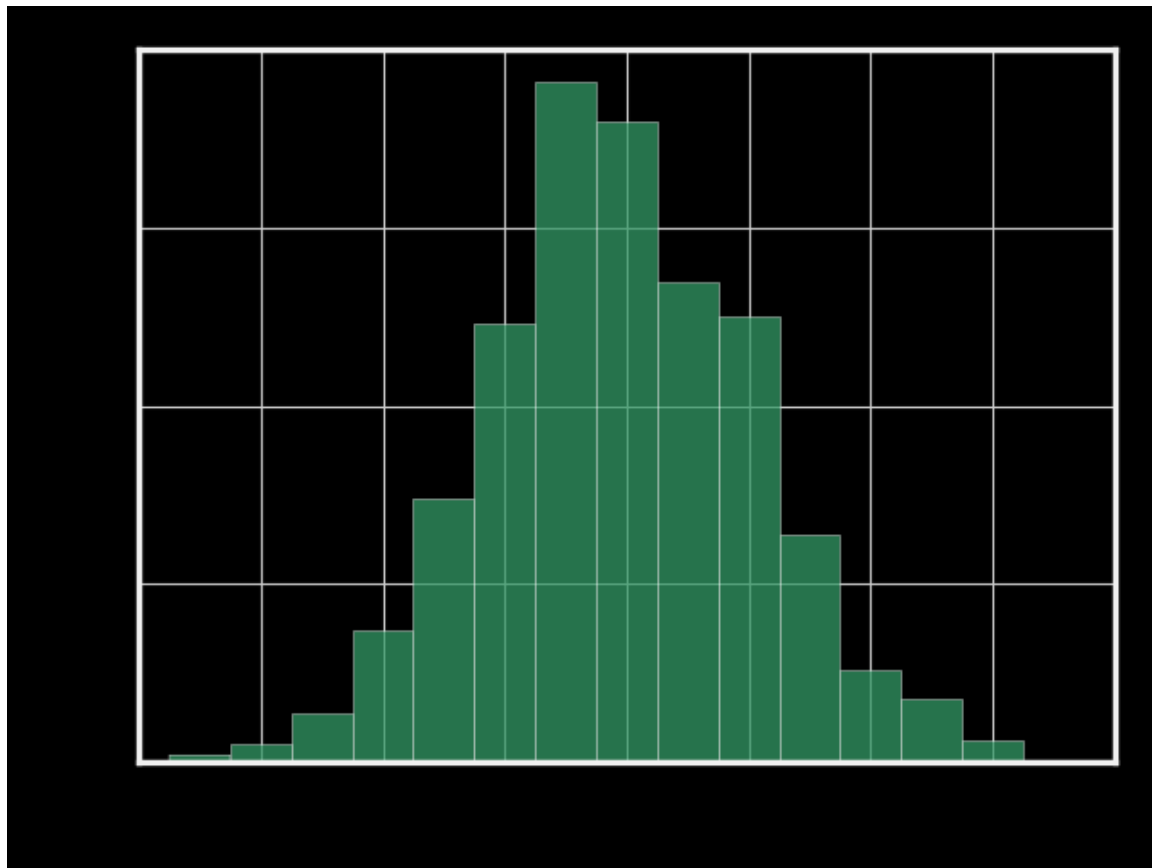
Each person in a group shuffles a deck of cards and keeps selecting a card until a queen appears. Find the mode of the following number of cards drawn from a deck until a queen appears.

3,12,3,11,5,5,3,10,12

Ans: Mode = 3 cards

Question 12

Given the following histogram, decide if the data is skewed or symmetrical.



Ans:

The data are skewed to the left.

The data are skewed to the right.

The data are symmetric.

Question 13

The answer choices below represent different hypothesis tests. Which of the choices are left-tailed tests? Select all correct answers.

Ans:

$H_0: X = 17.3$, $H_a: X \neq 17.3$

$H_0: X \geq 19.7$, $H_a: X < 19.7$

$H_0: X \geq 11.2$, $H_a: X < 11.2$

$H_0: X = 13.2$, $H_a: X \neq 13.2$

$H_0: X = 17.8$, $H_a: X \neq 17.8$

Question 14

Fill in the following contingency table and find the number of students who both go to the beach AND go to the mountains.

Students	go to the mountains	do not go to the mountains	Total
go to the beach			36
do not go to the beach		21	
Total	48		95

Ans: 10

Question 15

The answer choices below represent different hypothesis tests. Which of the choices are right-tailed tests? Select all correct answers.

Ans:

$H_0: X \geq 17.1$, $H_a: X < 17.1$

$H_0: X = 14.4$, $H_a: X \neq 14.4$

$H_0: X \leq 3.8$, $H_a: X > 3.8$

$H_0: X \leq 7.4$, $H_a: X > 7.4$

$H_0: X = 3.3$, $H_a: X \neq 3.3$

Question 16

As a member of a marketing team, you have been tasked with determining the number of DVDs that people have rented over the past six months. You sample twenty adults and decide that the best display of data is a frequency table for grouped data. Construct this table using four classes.

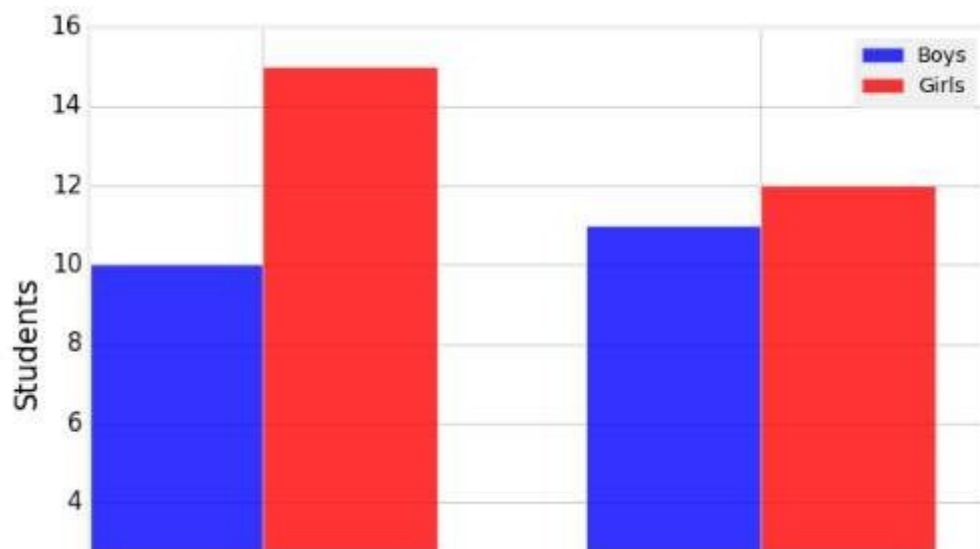
15,31,28,19,14,18,28,19,10,19,10,24,14,18,24,27,10,18,16,23

Ans:

Lower Class Limit	Upper Class Limit	Frequency
10	15	6
16	21	7
22	27	4
28	33	3

Question 17

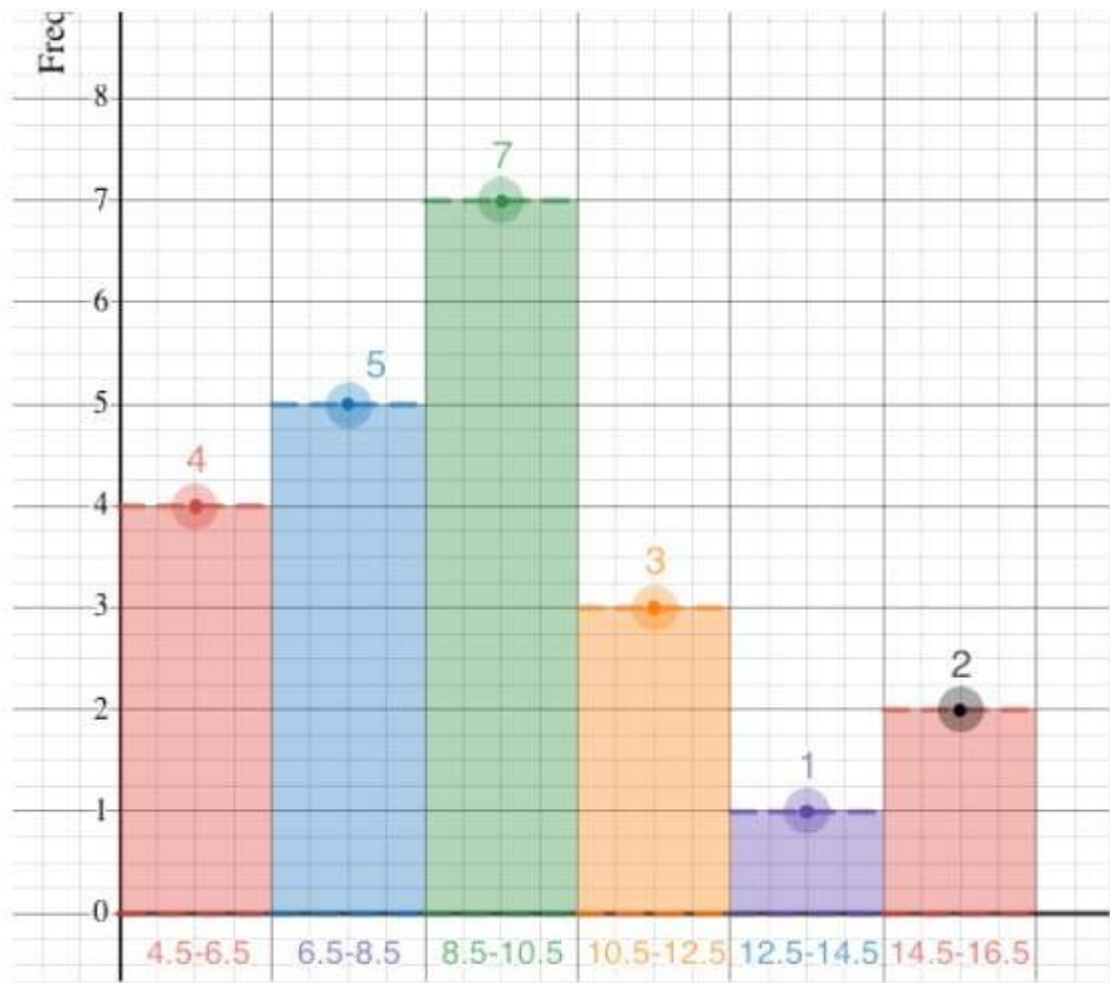
The bar graph below shows the number of boys and girls in different classes.



Ans: 23

Question 18

The histogram below displays the weights of rainbow trout (in pounds) caught by all visitors at a lake on a Saturday afternoon. According to this histogram, which range of weights (in pounds) contains the lowest frequency?



Ans: greater than 12.5 but less than 14.5

Question 19

The weight of a car can influence the mileage that the car can obtain. A random sample of 20 cars' weights and mileage is collected. The table for the weight and mileage of the cars is given below. Use Excel to find the best fit linear regression equation, where weight is the explanatory variable. Round the slope and intercept to three decimal places.

WeightMileage

30.	32.2
0	
20.	56.0
0	
20.	46.2
0	
45.	19.5
0	