

Solutions

Midterm 1 - STAT 301 Spring 2018

Name:

UIN:

Signature:

1. Do not open this test until told to do so.
2. Turn in your exam with your answers circled when you are done with the exam. You should not take the exam with you.
3. This is a closed book examination. You can only bring the normal z-tables to this exam. Use the cheat sheet provided on my website.
4. You have 60 minutes to work on this exam. There are 15 multiple choice questions. If you cannot do one question move on to the next.
5. You may use a calculator in the exam (but not a phone).
6. Partial credit is only given to answers which are correct (not partially correct).
7. If you are unsure of what a question is asking for, do not hesitate to ask the instructor or course assistant for clarification.
8. I use sd to denote standard deviation.
9. Good Luck!!!

(1-2) The four plots below are of [BASE] Baseball Salaries (in Millions) [HEIGHT] Heights of STAT301 students (in inches) [AVE HEIGHT] Average height of 5 randomly sampled STAT301 students (in inches) [PULSE] Resting heart rate of a person (in beats per minute).

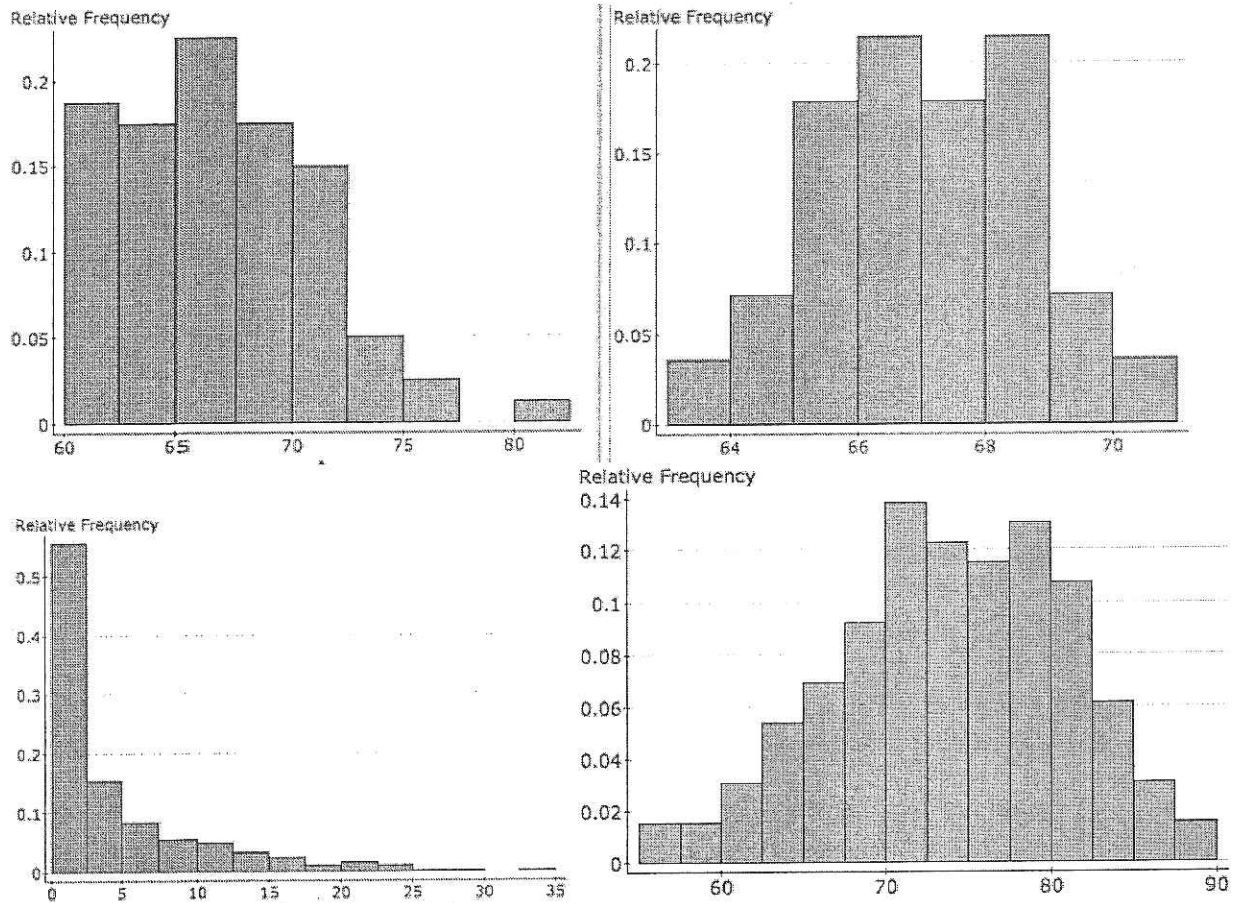


Figure 1: Top Left: Plot (1). Top Right: Plot (2), Bottom Left: Plot (3). Bottom Right: Plot (4).

(1) Match the plot to the variable.

	(1)	(2)	(3)	(4)
A	HEIGHT	PULSE	BASE	AVE HEIGHT
B	PULSE	HEIGHT	BASE	AVE HEIGHT
C	HEIGHT	AVE HEIGHT	BASE	PULSE
D	BASE	PULSE	HEIGHT	AVE HEIGHT
E	PULSE	BASE	AVE HEIGHT	HEIGHT

(2) Match the mean and standard deviation to each of the plots in Figure 1.

	(1)	(2)	(3)	(4)
A	mean = 66.7, sd = 12	mean = 66.7, sd = 7	mean = 4.3, sd = 35	mean = 73 and sd = 35
B	mean = 66.7, sd = 1.0	mean = 66.7, sd = 0.5	mean = 4.3, sd = 0.5	mean = 73 and sd = 1.0
C	mean = 66.7, sd = 12	mean = 69.0, sd = 7	mean = 0.0, sd = 35	mean = 71 and sd = 35
D	mean = 66.7, sd = 12	mean = 66.7, sd = 7	mean = 4.3, sd = 35	mean = 73 and sd = 35
E	mean = 66.7, sd = 4.2	mean = 66.7, sd = 1.7	mean = 4.3, sd = 5	mean = 73 and sd = 7

(3) Student walking into the MSC are being interviewed. They are asked (1) what is their Major (2) what bus they take (3) the number of house mates (4) their weight. Match the variable with the type of variable.

	Major?	Bus number?	Number of house mates?	Weight?
A	Numerical continuous	Categorical	Numerical discrete	Numerical continuous
B	Numerical continuous	Categorical	Numerical discrete	Numerical discrete
C	Categorical	Categorical	Categorical	Numerical discrete
D	Categorical	Numerical discrete	Numerical continuous	Numerical continuous
E	Categorical	Categorical	Numerical discrete	Numerical continuous

(4) In order to draw a sample of five students, each student in a STAT301 class is assigned a number and five numbers are randomly drawn (with replacement). What can we say about this method of sampling?

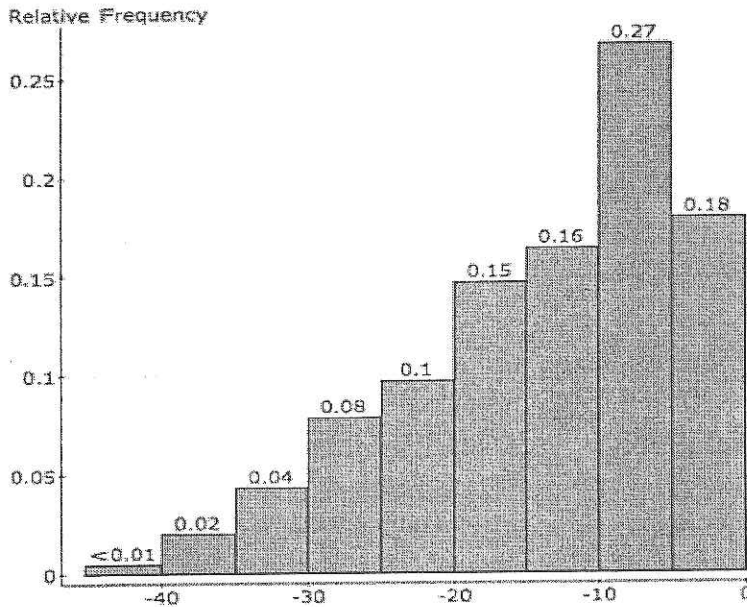
- $\frac{1}{2}$ (A) It is a simple random sample (SRS)
 (B) It is a biased sample of the STAT301 class.
 $\frac{1}{2}$ (C) It is an unbiased sample of the STAT301 class.
 (D) [A] and [B] **(E)** [A] and [C].

(5) Which statement(s) are correct?

- $\frac{1}{2}$ (A) If the IQR = 0, then a minimum requirement is 50% of the data must be the same.
 (B) If the standard deviation is zero, then a minimum requirement is that 50% of the data must be the same.
 $\frac{1}{2}$ (C) If the standard deviation is zero, then all the data must be the same.
(D) (A) and (C) [E] (B) and (C).

(6-7) Temperatures in Antarctic.

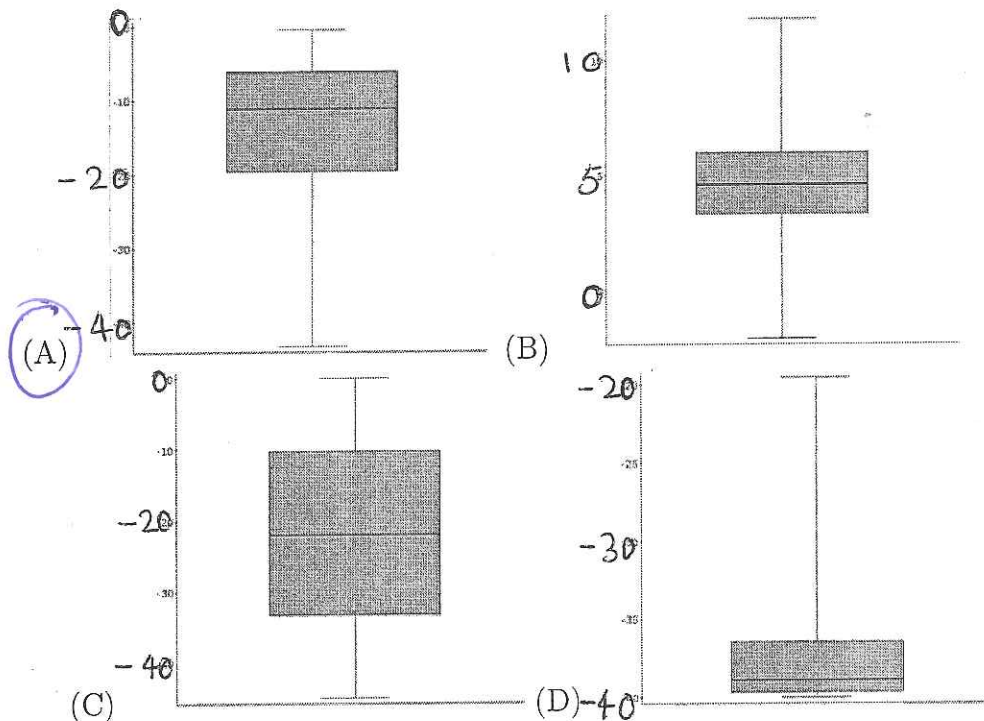
- (6) The mean and standard deviation of the data plotted in the histogram below is -10 and 10 respectively. Use the relative frequency histogram below to find the proportion of observations which are within 0.5 standard deviations of the mean?



- (A) 43%
 (B) 76%
 (C) 34%
 (D) 20%
 (E) 50%

- (7) Return to the histogram of temperatures in the Antarctic.

A boxplot of the temperatures is made and plotted in one of the four plots in the figure below. Which boxplot (A), (B), (C) or (D) corresponds to the Antarctic histogram temperatures?



(8) Which term best describes the studies below?

- (1) To assess the impact CO₂ has on diet, 50 mice were random assigned to one of two groups. One group was only given carbonated drink for six months, while the other group was only given uncarbonated beverages for six months.
- (2) To assess the impact CO₂ has on diet, 50 students were asked how much carbonated beverages they had drunk over the past six months.
- (3) A researcher observed that she ate more after a diet coke.

	1	2	3
(A)	Biased	Anecdotal	Observational
(B)	Biased	Observational	Confounding
(C)	Observational	Anecdotal	Experimental
(D)	Experimental	Observational	Anecdotal
(E)	Observational	Experimental	Biased

(9) This question is about z-scores/z-transforms. Which statement(s) is correct?

- (A) The z-score can only be applied to normally distributed data.
- ✓ (B) The z-score can be applied to any data set. Normality is only required when evaluating the percentage (using the z-tables).
- ✓ (C) The z-score measures the distance of a given observation from the mean relative to the standard deviation of the data.
- (D) [A] and [C] (E) [B] and [C]

(10) Guy scores 65% in both of his biology midterm 1 and midterm 2 exams.

The mean grade in midterm 1 is 80% with standard deviation 3%.

The mean grade in midterm 2 is 80% with standard deviation 20%.

Based on this information, which statement(s) is true?

- ✓ (A) Guy's grade in midterm 1 lies far below the majority of grades.
- (B) Guy's grade in midterm 1 is reasonably "close" to the mean relative to the standard deviation.
- (C) Guy's grade in midterm 2 lies far below the majority of grades.
- (D) (A) and (C) [E] (B) and (C).

Calculate the z-score in both cases

close to zero within the majority of grades.

$$z_1 = \frac{65 - 80}{3} = -5$$

$$z_2 = \frac{65 - 80}{20} = \frac{-15}{20} = -0.75$$

Very large, far from majority of grades.

(11-13) Suppose male heights are normally distributed with mean 68 inches and standard deviation 3 inches.

(11) What proportion of males have height **greater** than 63 inches?

- (A) 1.66% [B] 98.33% [C] 4.78% [D] 95.2% [E] 9.56%

(12) What proportion of males have height **between** 63 and 72 inches?

- (A) 97% [B] 99.86% [C] 86.1% [D] 3% [E] 98.7%

(13) Suppose that a male's height is in the **70%** percentile. What is his height?

- [A] 68.7 inches [B] 66.4 inches [C] 70.2 inches [D] 69.6 inches [E] 67.3 inches.

(14) Female heights are known to be normally distributed with mean 64.5 inches and standard deviation 2.5 inches.

Male heights are known to be normally distributed with mean 70 inches and standard deviation 4 inches.

Peter is 72 inches tall. Using equivalent percentiles, calculate how tall Peter would be if he were female.

- (A) 65.75 inches [B] 72 inches [C] 65 inches [D] 65.19 inches [E] 64 inches.

(15) Suppose the weight of one week old calves is normally distributed. What proportion of weights are within **0.7** standard deviations of the mean?

- (A) 47.7% [B] 75.8% [C] 51.6% [D] 35.0% [E] 70.0%