Midterm 1 - STAT 301
Fall 2019

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 on 6 sides. 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) Student on campus are being interviewed. They are asked their (1) Blood group (2) what bus they take (3) Miles per gallon for the car (MPG) and (4) their weight. Match the variable with the type of variable.

	Blood?	Bus number?	MPG?	Weight?
A	Numerical continuous	Categorical	Numerical discrete	Numerical continuous
B	Numerical continuous	Categorical	Numerical discrete	Numerical discrete
C	Categorical	Categorical	Numerical continuous	Numerical continuous
D	Categorical	Numerical discrete	Numerical continuous	Numerical continuous
E	Categorical	Numerical discrete	Numerical discrete	Numerical continuous

(2-3) Below is the relative frequency histograms of the weights and heights of super heroes.

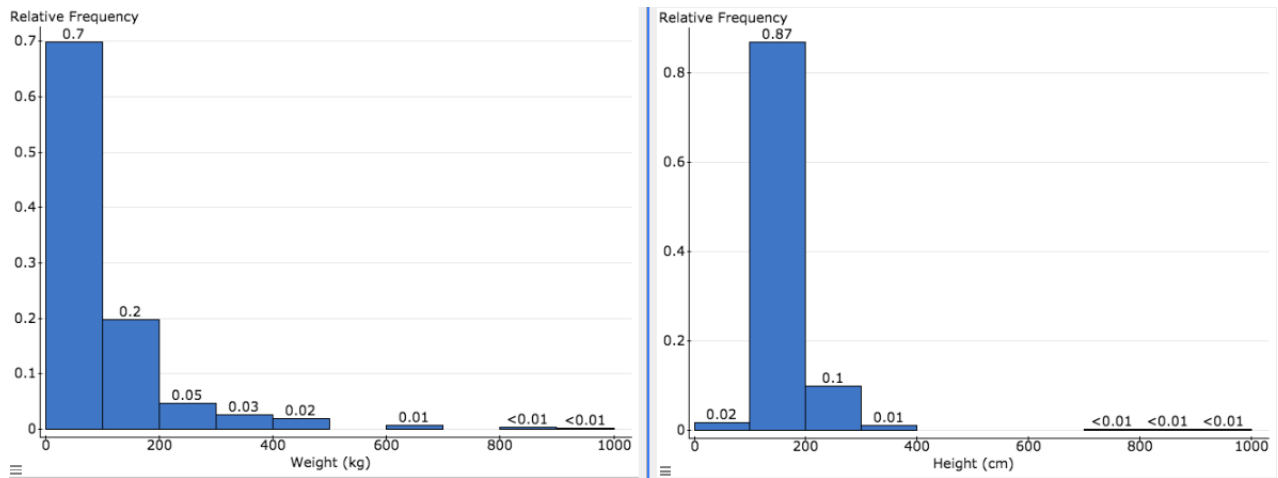
Figure 1: The left plot are Weights and the right plot are Heights

(2) Match the mean and standard deviation to the plot (look carefully at the axis).

	Left (weight)	Right (height)
A	mean $= 110$, sd $= 1000$	mean $= 186$, sd $= 1000$
B	mean $= 186$, sd $= 60$	mean $= 110$, sd $= 100$
C	mean $= 110$, sd $= 100$	mean $= 186$, sd $= 60$
D	mean $= 400$, sd $= 400$	mean $= 400$, sd $= 400$
E	mean $= 20$, sd $= 5$	mean $= 250$, sd $= 1000$

(3) Calculate the proportion of super hero **weights** in the interval $[0, 200)$ (0 to 200 kg).

(A) 90%   (B) 10%   (C) 0.9%   (D) 99.9%   (E) 68%.

(4) Which statement is correct?

    (A) If the mean is zero all the observations must be zero.

    (B) If the standard deviation is zero all the observations must be the same.

    (C) If the Interquartile Range is zero all the observations must be the same.

    (D) [A] and [B]   [(E)] (A), (B) and (C).

(5)
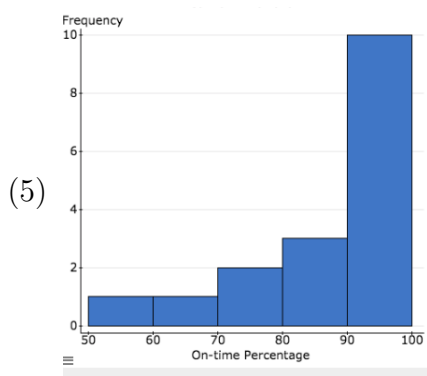
A histogram of proportion of the on time flights for a certain airline at various airports is given on the left.
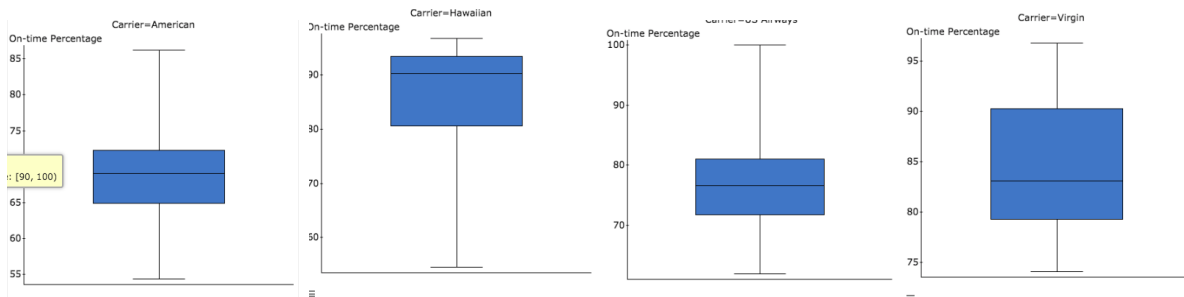
Match the histogram to the Boxplot.


Figure 2: Plots from left to right: (A), (B), (C) and (D).

(6) Suppose the weight of one week old calves is normally distributed. What proportion of weights are *within* **1.3** standard deviations of the mean?

    (A) 80.64%   (B) 88.7%   (C) 26.0%   (D) 9.6%   (E) 90.3%.

(7) A calf's weight is 1.8 standard deviations to the **LEFT** of the mean weight of calves. What is its corresponding **z-transform**?

    (A) 1.8   (B) -1.8   (C) 0.9641   (D) 0.0359   (E) 0.8.

(8) A group of A&M students were reminiscing about their favourite pokemon characters from their childhood. Currently the average age in the groups is $\underline{\mu}$=**21** years old with standard deviation $\underline{\sigma} = $ **1** year.

They decided their favourite pokemon character was Gastrodon, who first came out 10 years ago. What was the mean age and standard deviation of this group of students in **MONTHS**, *10 years ago*?

	mean	standard deviation
A	132 months	2 months
B	132 months	22 months
C	200 months	22 months
D	120 months	2 months
E	132 months	12 months

(9) The histogram of the midterm grades for statistics and biology is plotted below. The mean grade in both exams is **33** points.
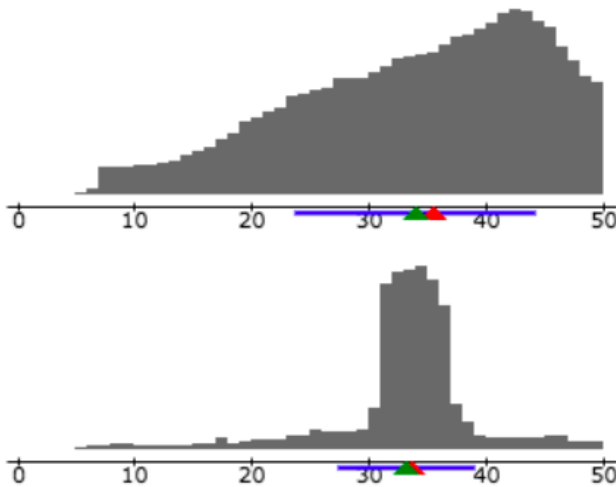
Top Plot: Histogram of **Statistics** Grades
Bottom Plot: Histogram of **Biology** Grades

In **both** exams, Sydney scores **48** points. Which statement is correct?

(A) The z-transform for Sydney's Statistics grade is **greater** than the z-score for Sydney's Biology grade.

(B) The z-transform for Sydney's Statistics grade is **less** than the z-score for Sydney's Biology grade.

(C) The z-transform for Sydney's Biology and Statistics grades are the **same**.

(D) The z-transform for Sydney's Biology exam is negative.

(E) The z-transform for Sydney's Statistics exam is negative.

(10-12) Vertical farming is a method for producing food in vertical stacked layers. In recent years it has become popular, as it allows for the production of fresh produce within cities. The technology is still new. Understanding how to optimize production is important. Several experiments have been done. And it is known that the number of iceburg lettuce producted in one crate is normally distributed with mean **68** lettuces and standard deviation **3**.

(10) What proportion of crates will have **less** than 63 lettuces?

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

(11) What proportion of crates will have **between** 63 and 72 lettuces?

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

(12) Suppose a crate is in the **70%** percentile. How many lettuces are there in the crate?

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

(13) Scientists are investigating the impact that a reduced calorie diet has on longevity. Below we describe three "studies":

(1) It was observed that residents in London (U.K), who were children during the second world war (where food was restricted) lived longer on average than people (again from London) born after the second world war, when food was plentiful.

(2) A recent CNN report discussed the case of a French lady who ate less than 800 calories a day since she was 10 years old and lived until she was 110.

(3) A researcher, randomly assigned twenty mice (all born from the same mother) into two groups. The first group of mice was put on a calorie reduced diet. The second group of mice was given unlimited food. The mice were monitored over their life time.

Which descriptions best describe each study:

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

(14) Fill in the three blanks

As the sample size **increases** the standard error of the sample mean ___(1)___ and the distribution of the sample mean becomes ___(2)___ .

The data ___(3)___ become more normal as the sample size increases.

	(1)	(2)	(3)
A	decreases	wider	will
B	decreases	narrower	will not
C	increases	wider	will
D	increases	narrower	will
E	increases	stays same	will not

(15) Below are four histograms. One is the histogram of the population of heights. The other three are the histograms of the distribution of sample means (taken from this population). The sample means are evaluated using different sample sizes.

Top: (1), Second top (2), Third (3) and Bottom (4).

Match the histogram to the sample size.
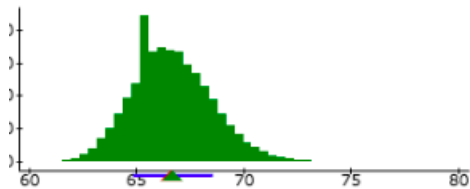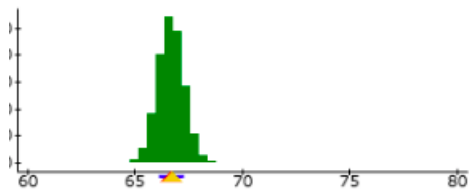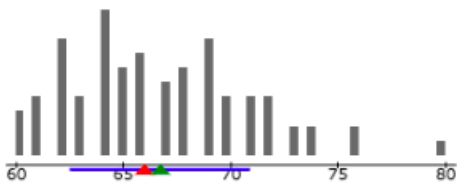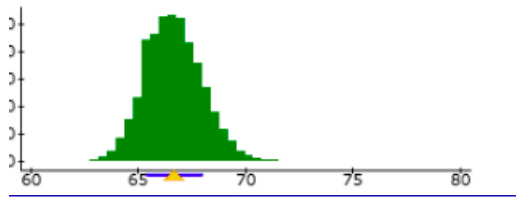
	(1)	(2)	(3)	(4)
A	Original	5	10	60
B	60	10	5	Original
C	10	60	Original	5
D	10	Original	60	5
E	10	Original	5	60