Midterm 1 - STAT 301
Fall 2016

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. A cheat sheet will be provided.

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) Students at Texas A&M were randomly sampled and asked four questions. What type of variable do we associate to each answer:

1	2	3	4
Their Major	Their GPA	Distance of home from Campus	Number of Siblings

Answer:

	1	2	3	4
A	Numerical continuous	Categorical	Numerical discrete	Numerical continuous
B	Numerical continuous	Categorical	Numerical discrete	Numerical discrete
C	Numerical discrete	Categorical	Categorical	Numerical continuous
D	Categorical	Numerical continuous	Numerical continuous	Numerical Discrete
E	Categorical	Numerical continuous	Numerical continuous	Numerical continuous

(2) On July 4th, 2015, the temperature in College Station was 102 degrees fahrenheit whereas the on the same day in Manchester the temperature was 30 degrees celsius. Temperature data for any given city is believed to follow a normal distribution.

Using historical records it is known that the mean temperature in College Station for July 4th is 98 Fahrenheit and the standard deviation is 2 degrees. Similarly, in Manchester for July 4th the mean temperature is 25 degrees Celcius with standard deviation 5 degrees. Which statement is correct?

(A) The temperature for College Station is in the 98% percentile whereas the temperaure for Manchester is in the 98.67% percentile.

(B) The z-transform for Manchester is $5/5 = 1$ and the z-transform for College Station is $4/2 = 2$.

(C) The temperature for College Station station is in a higher percentile than Manchester. Therefore relative to the city, the temperature in College Station is higher.

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

(3) Suppose female heights are normally distributed with mean 64.5 inches and standard deviation 2.5 inches. Which interval(s) below contain 80% of female heights (remember to round up the percentages)?

(A) $[61.3, 67.7]$ (B) $[59.6, 66.8]$ (C) $[63.8, 65.1]$

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

(4) A psychologist at the University of California, Irvine, is investigating the phenomena of false (or implanted) memories. False memories are events that never existed. Instead they are suggestions or stories implanted in such a pervasive and elaborate way that the person believes that they are a real memory.

She is collecting evidence on false memories. She collects the data in the following way:

(1) She questions 100 students and asks whether they believe some of their childhood memories are "false memories".

(2) She recruits people for a study and for each participant plants a memory. She spins an elaborate lie about a traumatic trip to a shopping mall where they got lost, before being rescued by a kind elderly woman and reunited with their parents. To make the event more plausible, she ropes in their families. She told the participants "weve talked to your mother, your mother has told us this happened to you." Nearly a third of the participants fell for it, with some recalling the event in vivid detail.

(3) The psychologist's mother drowned in a swimming pool when she was just 16. Years later, a relative convinced her that she had discovered her floating body. It all came flooding back, until a week later the same relative called and explained she had got it wrong, it was someone else.

The above are examples of:

	1	2	3
A	Observational	Experimental	Anecdotal Evidence
B	Experimental	Observational	Anecdotal Evidence
C	Ancedotal Evidence	Observational	Experimental
D	Ancedotal Evidence	Experimental	Observational
E	Experimental	Anecdotal Evidence	Observational

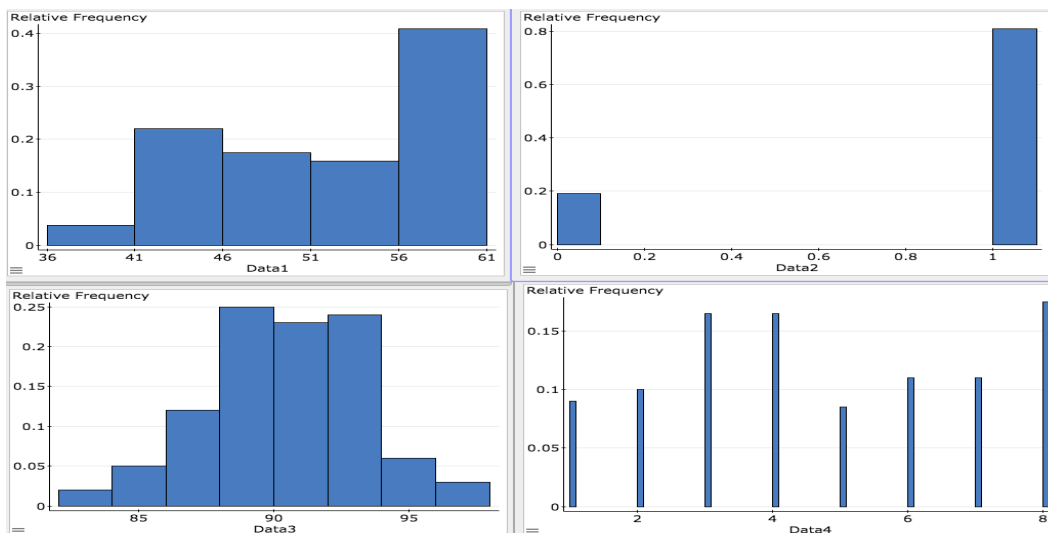(5) The relative frequency histograms of four data sets are given in Figure 1.

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

Match the histogram to the data sets:

1. The temperature in College Station in July (in Fahrenheit). Called Temp.

2. The time a student takes to complete a midterm 1 exam (maximum 60 minutes). Called Midterm.

3. The result of an eight sided die. Each side is numbered from 1 to 8 (yes, they do exist!). Called Die.

4. The number of cars a student has in College Station. Called Cars

|	(1)	(2)	(3)	(4)
A	Car	Midterm	Temp	Die
B	Temp	Car	Midterm	Die
C	Midterm	Cars	Temp	Die.
D	Midterm	Die	Temp	Car
E	Temp	Die	Car	Midterm

(6) Mean and standard deviation. Match the data set to the mean and standard deviation.

	CS Temp July (F)	Exam Time	8 sided die	Student cars
A	mean = 90.3, sd = 20	mean = 58, sd = 7	mean = 4, sd = 2.3	mean = 1, sd = 1.5
B	mean = 90.3, sd = 3	mean = 52, sd = 7	mean = 4, sd = 2.3	mean = 0.81, sd = 0.4
C	mean = 60, sd = 3	mean = 50, sd = 20	mean = 6, sd = 2.3	mean = 0.81, sd = 1
D	mean = 90.3, sd = 3	mean = 30, sd = 10	mean = 3, sd = 2.3	mean = 2, sd = 0.4
E	mean = 70, sd = 10	mean = 52, sd = 20	mean = 4, sd = 2.3	mean = 2, sd = 0.4

(7) Suppose that the length of pelican beaks are normally distributed. What proportion of lengths will be within 1.5 standard deviations of the mean?

(A) 81.5%   (B) 93.3%   (C) 97%   (D) 71.125%   (E) 86.6%.

(8) A boxplox of some data is given below. The mean is 1.1 and median is 0.4. What are the main features of the distribution?
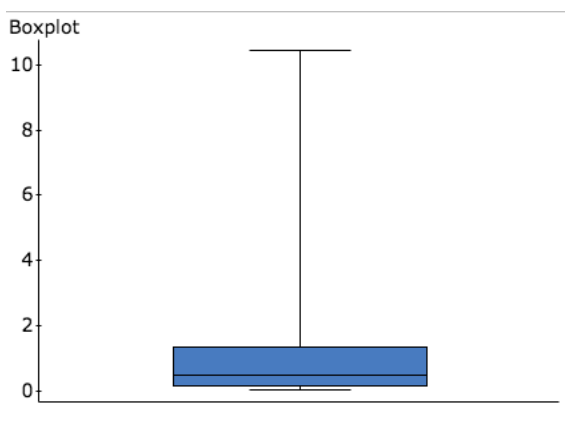
(A) Right Skewed   (B) Left skewed

(C) Symmetric   (D) Thick Tails

(E) (A) and (C).

(9) Everyday for one month the temperature at 10am in College Station was recorded in Fahrenheit. The mean temperature was 80 degrees Fahrenheit and standard deviation was 5 degrees.

The temperatures are converted into celsius using the transformation
Celsius $= \frac{5}{9} \times$ (Fahrenheit $- 32$). What is the mean and standard deviation in Celsius?

(A) mean $= 26.6$, sd $= -15$ (B) mean $= 26.6$, sd $= 15$ (C) mean $= 2.6$, sd $= 20.5$

(D) mean $= 44$, sd $= 2.7$ (E) mean $= 26.6$, sd $= 2.7$

(10) In a study researchers collected data on students who passed or failed an exam and whether they were right handed or left handed. 200 students were questioned. The data is summarized below. What proportion of the **left handed students** passed the exam?

	Hand		
	Left	Right	
Fail	16	64	80
Pass	9	111	120
	25	175	200

(A) 4.5%   (B) 60%   (C) 36%

(D) 40%   (C) 12%.

(11-13) The mean ACT score is **20** and the standard deviation **5**. A class of 50 students are taking the ACT.

(11) What is the mean and standard error of the class average (sample mean) score?

(A) mean $= 20$, s.e. $= 20$ (B) mean $= 20$, s.e $= 0.7$

(C) mean $=$ unknown, s.e. $=$ unknown (D) mean $= 20$, s.e $=$ unknown.

(E) mean $=$ unknown, s.e. $= 2.8$.

(12) Calculate the chance the average (sample mean) grade in the class is **above** 19.

(A) 92.2%   (B) 7.8%   (C) 58%   (D) 42%   (E) 50%.

(13) A histogram and QQplot of ACT scores is given below.
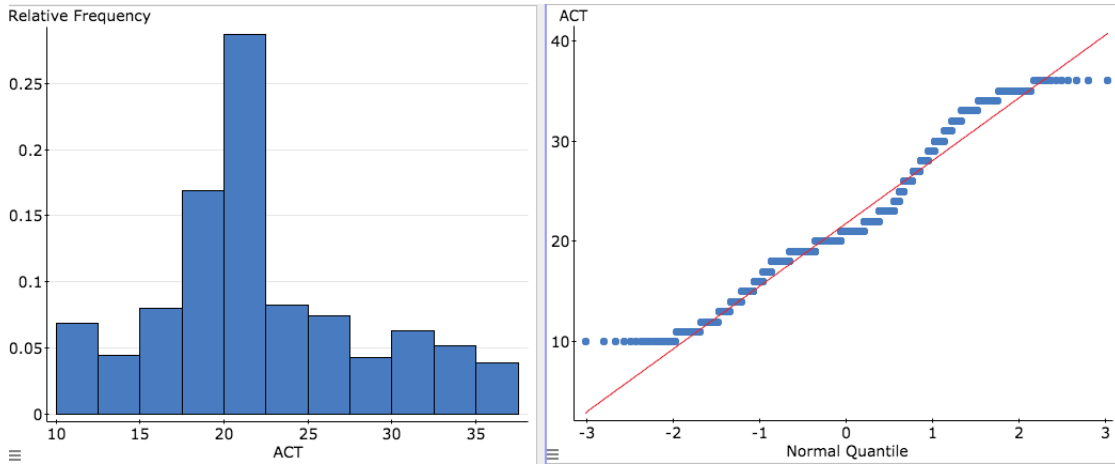
Based on this plot which statement(s) are correct:

(A) ACT scores are not normally distributed.

(B) The average (sample mean) ACT score based on a sample size of 50 will be close to normally distributed.

(C) The probability calculated in (12) will be close to the true probability (the true distribution of the sample mean).

(D) None of the above.   (E) [A], [B] and [C].

(14) The distribution of scores in an exam are given in the relatively frequency histogram below. Calculate the chance of scoring between **4 and 10** in the exam (if you a more precise statement the question asks for the proportion greater than or equal to 4 but less than 10; note that the histogram in the plots give the probabilities plot greater than or equal to the lower part of an interval but less than the upper part of the interval).
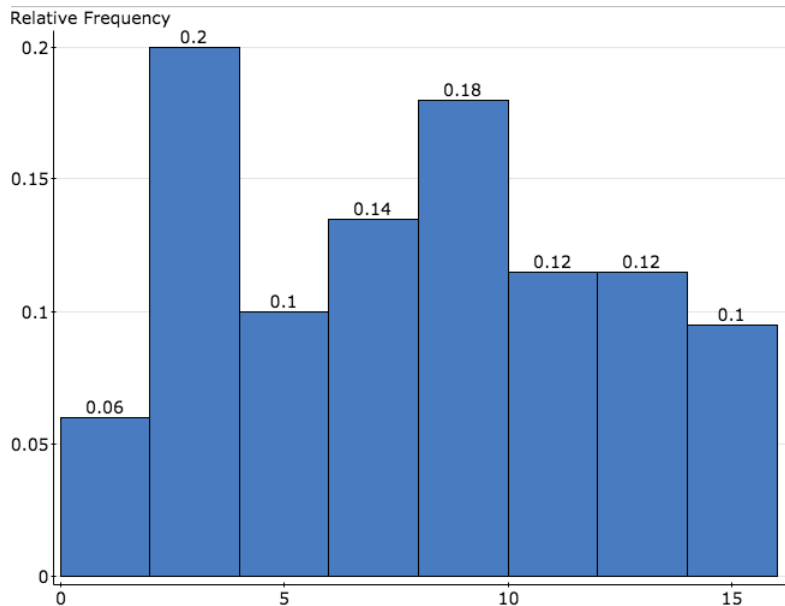
(A) 26%   (B) 34%   (C) 66%   (D) 28%   (E) 42%

(15) Below we plot the distribution of a population (sample size one), together with the distribution of the sample mean when the sample size is 2 and 15. Match the distribution with the plot.
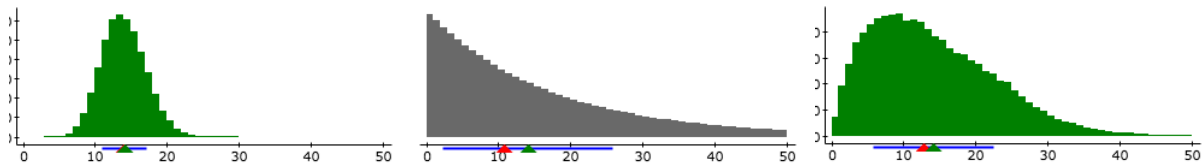

Figure 2: Left: Plot (1), Middle Plot (2), Right: Plot (3)

	1	2	3
(A)	Sample size 15	Sample size 2	Sample size 1
(B)	Sample size 2	Sample size 15	Sample size 1
(C)	Sample size 1	Sample size 15	Sample size 2
(D)	Sample size 1	Sample size 2	Sample size 15
(E)	Sample size 15	Sample size 1	Sample size 2