Midterm 2 - STAT 301
Fall 2017

Name:

UIN:

Signature:

Version A:

1. Do not open this test until told to do so.
2. This is a closed book examination, However you may use the cheat sheet provided to you, the t and z tables. You should have no other printed or written material with you on the exam. But scrap paper is allowed.
3. You have 60 minutes to work on this exam. There are **16** multiple choice questions.
4. On the scantron please state the version of exam that you have.
5. You may use a calculator in the exam.
6. If there is no correct answer or if multiple answers are correct, select the **best** answer.
7. Unless stated otherwise, do all tests at the 5% level.
8. If you are unsure of what a question is asking for, do not hesitate to ask the instructor or course assistant for clarification (however we are limited in the amount of help we can offer).
9. Please only give one answer per question (the one that is closest to the solution).
10. Good Luck!!!

(1-3) Suppose adult male heights are normally distributed with mean 70 inches and standard deviation 3 inches (both the population mean and standard deviation are known).

(1) Calculate the proportion of adult males who are **less** than 65.5 inches.

(A) 1.5% (B) 93.3% (C) 98.5% (D) 6.6% (E) 4.5%

(2) What is the population mean and standard error of the average height (the sample mean) of 5 randomly sampled adult males?

(A) $\mu = 70$, se $= \frac{3}{5}$ (B) $\mu = \frac{70}{5}$ and se $= \frac{3}{\sqrt{5}}$ (C) $\mu = \frac{70}{5}$ and se $= \frac{3}{5}$
(D) $\mu = 70$, se $= \frac{3}{\sqrt{5}}$ (E) μ is unknown and se is unknown.

(3) Calculate the chance that the average height (sample mean) of **5** randomly selected adult males is **less** than 65.5 inches.

(A) 3.35% (B) 0.04% (C) 99.96% (D) 100% (E) 1.32%

(4) The maximum load a Blocker elevator can take is 1500 pounds. Suppose the weight of a person is normally distributed with mean **150** pounds and standard deviation **35** pounds. What is the chance that **8** people will exceed the maximum weight restriction?

(A) 99.87% (B) 14.1% (C) 85.5% (D) 3.0% (E) 0.12%.

(5) A 95% confidence interval for the mean number of siblings a student at Texas A&M has is $[2.3, 2.7]$. Which statement is correct about the confidence interval ($\bar{x}$ denotes sample mean and MoE the Margin of Error)?

(A) $\bar{x} = 2.0$ (B) MoE $= 0.2$ (C) MoE $= 0.4$ (D) [A] and [B] (E) [A] and [C]

(6) A high-tech company wants to know how many portable devices people own. They intend to draw a random sample from the general population and use the data to construct a 95% confidence interval for the mean number of devices. It is believed that the standard deviation is between $1 - 3$. What is the minimum number of people required to be surveyed such that the margin of error is at **most** 0.25?

(A) 554 (B) 246 (C) 387 (D) 62 (E) 652.

(7) Which statement(s) are correct?

(A) The t-distribution corrects for the lack of normality of the sample mean.

(B) The sample standard deviation tends to get closer to the population standard deviation as the sample size increases.

(C) 1000 students were asked how many siblings they had. The QQplot and histogram of this data set will show that the distribution of number of siblings is close to normal.

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

(8-10) The number of chirps a second made by 15 crickets is measured. The data is summarized below.

One sample T confidence interval:
μ : Mean of variable

95% confidence interval results:

Variable	Sample Mean	Std. Err.	DF	L. Limit	U. Limit
ChirpsPerSecond	16.653333	0.43946577	14	15.710773	17.595894

(8) Based on the statcrunch output, what is the 95% confidence interval for the mean number of chirps a cricket makes in a second?

(A) 16.6 (B) [15.7,17.6] (C) [16.2,17.0] (D) [14.0,17.9] (E) [14.0,15.7]

(9) An entomologist believes that the mean number of chirps a cricket makes in a second is more than 16.4. Based on your answer in Q8, can we be confident that the mean number of chirps is more than 16.4?

(A) Yes, it is more than 16.4 (B) No, it is less than 16.4

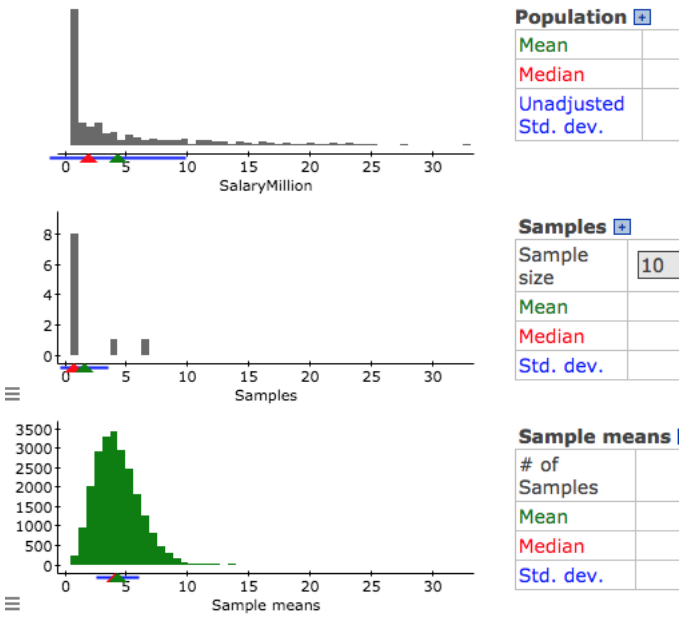
(C) Based on the data collected, we do not know.

(10) Based on the Statcrunch output above, what is the sample standard deviation for the number of chirps a cricket makes in a second.

(A) 0.44 (B) 0.11 (C) 0.95 (D) 1.7 (E) 6.6

(11) Baseball salaries are known to be heavily right skewed. 10 professional baseball players are randomly sampled. The average salary of these 10 baseball players is 1.56 million dollars.

Statistics tells us this average comes from a distribution. To find the distribution of the averages we use the sampling distribution applet in Statcrunch. Which statement(s) are correct?



(A) 1.56 is a number drawn from the top plot.

(B) 1.56 is a number drawn from the bottom plot.

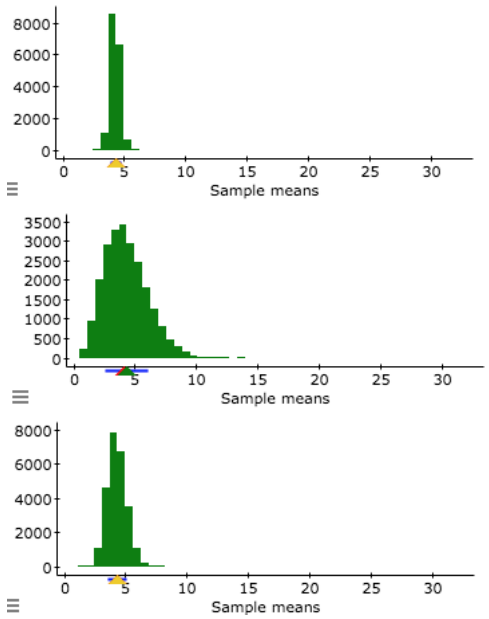
(C) The distribution of the sample mean based on 10 is **less** right skewed than baseball salaries.

(D) The distribution of the sample mean based on 10 is **more** right skewed than baseball salaries.

(E) [B] and [C].

(12) The distribution of the sample means for various sample sizes are plotted below.

The top plot we call Plot 1. The middle plot we call Plot 2. The botton plot we call Plot 3.



Match the sample sizes ($n = 10, 40$ and 80) to the plots.

	Plot 1	Plot 2	Plot 3
A	10	40	80
B	80	40	40
C	40	80	40
D	10	80	40
E	80	10	40

(13-14)

(13) 31 people reviewed a product. A summary of the reviews are given below.

Summary statistics:

Column	n	Mean	Variance	Std. dev.	Std. err.
Amazon	31	4.6774194	0.69247312	0.8321497	0.1494585

Given the summary statistics, construct a 99% confidence interval for the mean of all reviews (use a t-distribution).

(A) [2.39,6.95] (B) [4.26,5.08] (C) [4.59,4.74] (D) [2.62,6.71] (E) [4.42,4.92]

(14) Based on the statcrunch app below (where both the sample mean and its corresponding QQplot is given), how reliable is the confidence interval constructed in in Q13?

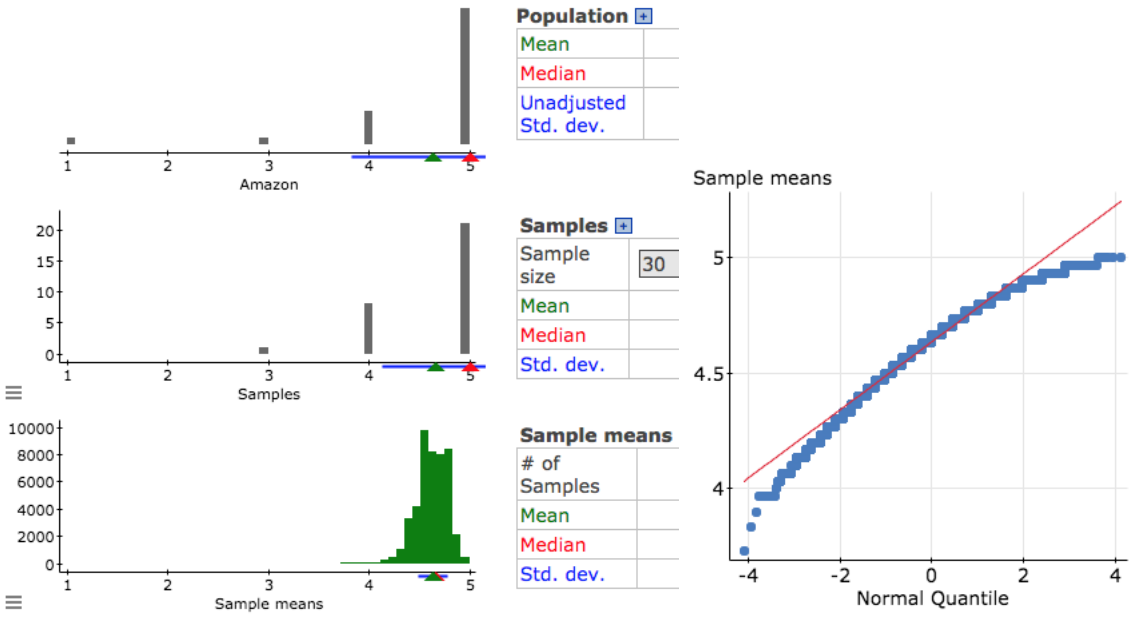


Figure 1: Left: Data and sample mean. Right: QQplot of sample mean

(A) The distribution of the sample mean is normally distributed.

(B) From the app, we see that we have 99% confidence in the interval.

(C) From the app, we see that we **do not** have 99% confidence in the interval.

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

(15) Several 95% confidence intervals for different sample sizes (both drawn from the same distribution) are constructed below. Which statement(s) are correct?

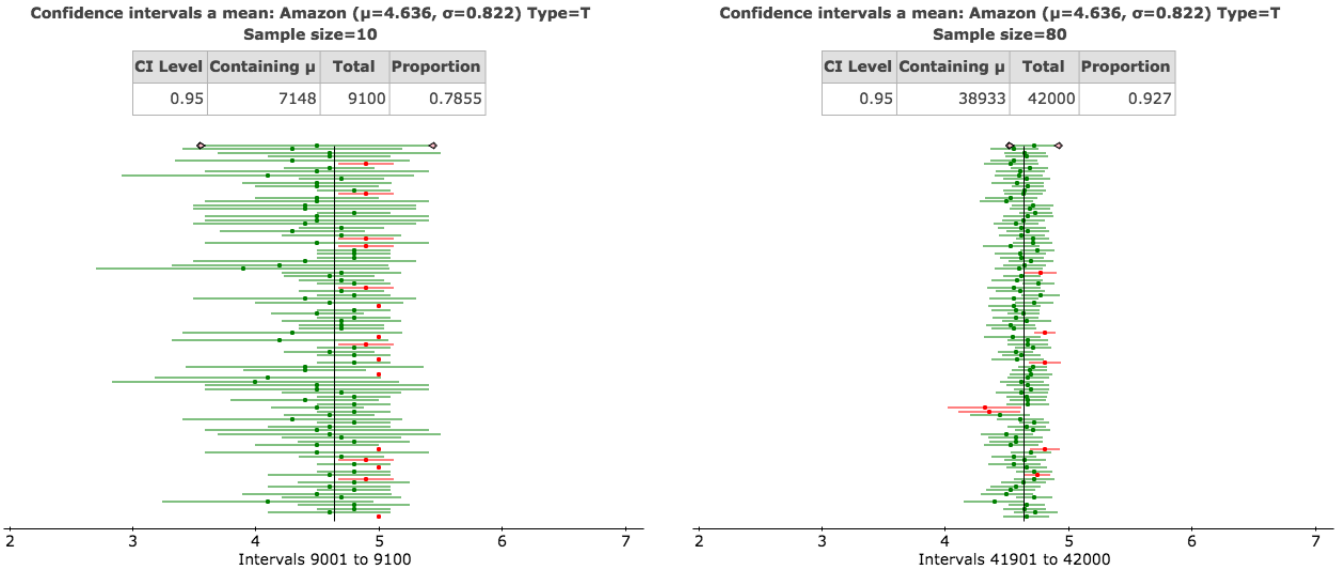


Figure 2:

(A) There is a mismatch between the true confidence level and the stated confidence level (of 95%) because the sample mean is not normally distributed.

(B) As the sample size grows the confidence interval becomes narrower because the standard errors gets smaller.

(C) The **t-distribution** is used to correct for the lack of normality of the data.

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

(16) A professor suspects that students who take GENE301 at 8am tend to do **better** than the students who take GENE301 at other times in the day. The (population) **mean** score for students who take GENE301 at any time of the day is 72%. In a sample of 30 students who took the class at 8am, the sample mean was 75%.

What is the professor's hypothesis of interest?

(A) $H_0 : \mu \geq 75\%$ vs $H_A : \mu < 75\%$ (B) $H_0 : \mu \leq 75\%$ vs $H_A : \mu > 75\%$

(C) $H_0 : \mu \geq 72\%$ vs $H_A : \mu < 72\%$ (D) $H_0 : \mu \leq 72\%$ vs $H_A : \mu > 72\%$

(E) $H_0 : \mu = 72\%$ vs $H_A : \mu \neq 72\%$.