

<b>Started on</b>	Sunday, 12 December 2021, 7:12 PM
<b>State</b>	Finished
<b>Completed on</b>	Sunday, 12 December 2021, 8:57 PM
<b>Time taken</b>	1 hour 45 mins
<b>Marks</b>	20.75/25.00
<b>Grade</b>	8.30 out of 10.00 (83%)

Question 1

Correct

Mark 1.00 out of 1.00

A random sample of size  $n=16$  is selected from a normal population with a mean of 84 and a standard deviation of 8. A second random sample of size  $n=9$  is taken from another normal population with a mean of 80 and standard deviation 12. Let  $X_1$  and  $X_2$  be the two sample means. Find  $P(X_1 - X_2 \leq 4.5)$ .

Let  $P(Z \leq 0.11) = 0.5438$ ;  $Z$  is a normal standard random variable.

☐ a. 0.4562

☐ b. 1

☒ c. 0.5438

☐ d. 0.6438

☐ e. None of others

$$\begin{array}{ccc} \mu_1 = 84, \sigma_1 = 8 & \mu_2 = 80 & \sigma_2 = 12 \\ \swarrow \quad \searrow & & \swarrow \quad \searrow \\ n_1 = 16 & & n_2 = 9 \\ x_1 & & x_2 \end{array}$$

$$\begin{aligned} & P(x_1 - x_2 \leq 4.5) \\ &= P\left(Z \leq \frac{4.5 - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}\right) \end{aligned}$$



Your answer is correct.

The correct answer is:  
0.5438

$$= P(Z \leq 0.11) = 0.5438$$

Question **2**

Correct

Mark 1.00 out of 1.00

The amount of time that a customer spends waiting at an airport check - in counter is random variable with mean 7.3 minutes and standard deviation 1.8 minutes. Suppose that a random sample of  $n = 36$  customers is observed. Find the probability that the average time waiting in line for these customers is less than 8 minutes. Let  $P(Z \leq 5) = 1$ ;  $P(Z \leq 2.33) = 0.99$ .

- ☐ a. None of the others
- ☒ b. 0.99
- ☐ c. 1
- ☐ d. 0



The correct answer is: 0.99

Question **3**

Incorrect

Mark 0.00 out of 1.00

Assume that human body temperatures are normally distributed with a mean of 98 (degree F) and a standard deviation of 0.5(degree F). Describe the sampling distribution for the sample mean body temperature of 50 selected persons.

- ☐ a. Normal with a mean of 98(degree F) and a standard deviation of 0.07(degree F)
- ☒ b. Approximately normal with a mean of 98(degree F) and a standard deviation of 0.07(degree F)
- ☐ c. Normal with a mean of 98(degree F) and a standard deviation of 0.01(degree F)
- ☐ d. None of the other choices is correct
- ☐ e. Approximately normal with a mean of 98(degree F) and a standard deviation of 0.01(degree F)



Your answer is incorrect.

The correct answer is:

Normal with a mean of 98(degree F) and a standard deviation of 0.07(degree F)

Question **4**

Correct

Mark 1.00 out of 1.00

A population has a proportion of  $p=0.45$ . If a simple random sample of 625 is drawn, what is the probability the sample population  $\bar{p}$  is greater than 0.48? That is, what is  $P(\bar{p} > 0.48)$ ?

- ☐ a. 0.03522021
- ☒ b. 0.06583401
- ☐ c. 0.19747690
- ☐ d. 0.08056247



Your answer is correct.

The correct answer is:  
0.06583401

Question **5**

Correct

Mark 1.00 out of 1.00

A population has a mean of  $m=100$  and a standard deviation of  $s=15$ . If we draw a simple random sample of size  $n=36$ , what is the probability that the sample mean  $\bar{x}$  will be less than 105? That is, what is  $P(\bar{x} < 105)$ ?

- ☒ a. 0.9772499
- ☐ b. 0.9522096
- ☐ c. 0.9087888
- ☐ d. 0.9901847



Your answer is correct.

The correct answer is:  
0.9772499

Question **6**

Correct

Mark 1.00 out of 1.00

Which of the following is true regarding the sampling distribution of the mean for a large sample size?

- ☐ a. It has a normal distribution with the same mean and standard deviation as the population
- ☒ b. It has a normal distribution with the same mean as the population but with a smaller standard deviation
- ☐ c. It has the same shape, mean, and standard deviation as the population
- ☐ d. It has the same shape and mean as the population, but has a smaller standard deviation



Your answer is correct.

The correct answer is:

It has a normal distribution with the same mean as the population but with a smaller standard deviation

Question 7

Correct

Mark 1.00 out of 1.00

The monthly electrical utility bills of all customers for the Far East Power and Light Company are known to be distributed as a normal distribution with a mean equal to \$87 a month and a standard deviation of \$36. If a statistical sample of  $n = 100$  customers is selected at random, what is the probability that the mean bill for those sampled will exceed \$75? Let  $P(Z < -3.33) = 0$ ,  $P(Z < 0.33) = 0.63$  and  $P(Z < -0.44) = 0.33$ .

- ☐ a. None of these
- ☒ b. About 1.00
- ☐ c. 0.33
- ☐ d. Approximately 0.63



Your answer is correct.

The correct answer is:  
About 1.00



Question 8

Correct

Mark 1.00 out of 1.00

A random sample of size  $n_1 = 16$  is selected from a normal population with a mean of 84 and a standard deviation of 8. A second random sample of size  $n_2 = 9$  is taken from another normal population with a mean of 80 and standard deviation 12. Let  $X_1$  and  $X_2$  be the two sample means. Find  $P(X_1 - X_2 \leq 4.5)$ . Let  $P(Z \leq 0.11) = 0.5438$ ;  $Z$  is a normal standard random variable.

- ☐ a. 1
- ☐ b. None of the others
- ☒ c. 0.5438
- ☐ d. 0.4562
- ☐ e. 0.6438



The correct answer is: 0.5438

Question 9

Incorrect

Mark 0.00 out of 1.00

The number of pounds of steam used per month by a chemical plant is thought to be related to the average ambient temperature (in F) for that month. The past year's usage and temperature are shown in the following table:

Mon	Temp.	Usage/1000	Mon	Temp.	Usage/1000
Jan.	21	185.79	July	68	621.55
Feb.	24	214.47	Aug.	74	675.06
Mar.	32	288.03	Sept.	62	562.03
Apr.	47	424.84	Oct	50	452.93
May	50	454.58	Nov.	41	369.95
June	59	539.03	Dec.	30	273.98

What is the estimate of expected steam usage when the average temperature is 55 F ?

- ☐ a. None of the others
- ☒ b. 34.29
- ☐ c. 33.17
- ☐ d. 39.2



Your answer is incorrect.

The correct answer is:

33.17

Question **10**

Correct

Mark 1.00 out of 1.00

If  $N = 15$  and  $n = 3$ , how many unique simple random samples are possible

- ☐ a. 105
- ☐ b. 1365
- ☒ c. 455
- ☐ d. 3003



Your answer is correct.

The correct answer is:  
455

Question **11**

Correct

Mark 1.00 out of 1.00

If we select a sample with sample size 40 from a population with mean of 20 and standard deviation of 5 then:

- ☐ a. Sample mean will be approximately normally distributed with mean of 20 and standard deviation of 5.
- ☐ b. Sample mean will be exactly normally distributed with mean of 20 and standard deviation of 5.
- ☒ c. Sample mean will be approximately normally distributed with mean of 20 and standard deviation of 0.79.
- ☐ d. Sample mean will be exactly normally distributed with mean of 20 and standard deviation of 0.79.



Your answer is correct.

The correct answer is:

Sample mean will be approximately normally distributed with mean of 20 and standard deviation of 0.79.

Question **12**

Correct

Mark 1.00 out of 1.00

If  $N=12$  and  $n=3$ , what is the probability of any given simple random sample?

- ☐ a. 0.015151520
- ☒ b. 0.004545455
- ☐ c. 0.001262626
- ☐ d. 0.002020202

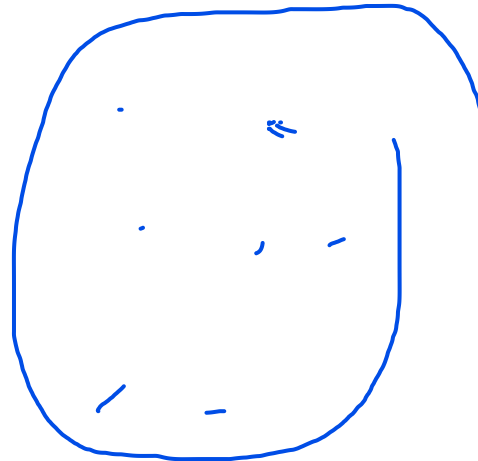
1

$12C3$



Your answer is correct.

The correct answer is:  
0.004545455



1  
 $12C3$

Question **13**

Correct

Mark 1.00 out of 1.00

A population has a mean of  $m=100$  and a standard deviation of  $s=15$ . If we draw a simple random sample of size  $n=36$ , what is the probability that the sample mean  $\bar{x}$  will be greater than 98? That is, what is  $P(\bar{x} > 98)$ ?

- ☐ a. 0.8246761
- ☒ b. 0.7881446
- ☐ c. 0.7030986
- ☐ d. 0.7475075



Your answer is correct.

The correct answer is:  
0.7881446

Question **14**

Correct

Mark 1.00 out of 1.00

Which of the following pairs of sample size  $n$  and population proportion  $p$  would produce the greatest standard deviation for the sampling distribution of a sample proportion  $p$ ?

- ☐ a.  $n = 1,000$  and  $p$  close to 1
- ☒ b.  $n = 100$  and  $p$  close to  $1/2$
- ☐ c.  $n = 1,000$  and  $p$  close to 0
- ☐ d.  $n = 100$  and  $p$  close to 0
- ☐ e.  $n = 1,000$  and  $p$  close to  $1/2$



Your answer is correct.

The correct answer is:  
 $n = 100$  and  $p$  close to  $1/2$

Question **15**

Correct

Mark 1.00 out of 1.00

The human body temperature is normally distributed with the mean of 99 (degree F) and a standard deviation of 0.5 (degree F). A random sample of 99 is selected, describe the sampling distribution for the sample mean.

- ☐ a. None of the other choices is correct
- ☐ b. Normal with a mean of 1 and a standard deviation of 0.005
- ☐ c. Normal with a mean of 1 and a standard deviation of 0.05
- ☐ d. Normal with a mean of 99 and a standard deviation of 0.005
- ☒ e. Normal with a mean of 99 and a standard deviation of 0.05



Your answer is correct.

The correct answer is:

Normal with a mean of 99 and a standard deviation of 0.05



Question **16**

Incorrect

Mark 0.00 out of 1.00

Suppose that sample of size  $n = 25$  are selected at random a normal population with mean 100 and standard deviation 10. What is the probability that the sample mean falls in the interval from 97 to 102 ? Let  $P(Z \leq -1.5) = 0.0668$ ;  $P(Z \leq 1) = 0.8413$ ;  $P(Z \leq 5) = 1$ .

- ☒ a. none of these
- ☐ b. 0.1587
- ☐ c. 0.7745
- ☐ d. 0.9332
- ☐ e. 1



The correct answer is: 0.7745

Question **17**

Correct

Mark 1.00 out of 1.00

A population has a mean of  $m=100$  and a standard deviation of  $s=15$ . If we draw a simple random sample of size  $n=36$ , what is the probability that the sample mean  $\bar{x}$  will be greater than 95 but less than 97? That is, what is  $P(95 < \bar{x} < 97)$ ?

- ☐ a. 0.1206442
- ☐ b. 0.1108649
- ☐ c. 0.07094133
- ☒ d. 0.09231954



Your answer is correct.

The correct answer is:  
0.09231954

Question **18**

Correct

Mark 1.00 out of 1.00

Choose the true statement(s):

- ☐ a. In statistical inference, the reasoning is from population to a sample .
- ☐ b. Population is in sample.
- ☒ c. Population is any finite or infinite collection of individual units or objects.
- ☐ d. Population is any subset of the elements of a sample.



Your answer is correct.

The correct answer is:

Population is any finite or infinite collection of individual units or objects.

Question **19**

Correct

Mark 1.00 out of 1.00

In one region of the country, the mean length of stay in hospitals is 5.5 days with standard deviation 2.6 days. Because many patients stay in the hospital for considerably more days, the distribution of length of stay is strongly skewed to the right. Consider random samples of size 100 taken from the distribution with the mean length of stay,  $x$ , recorded for each sample. Which of the following is the best description of the sampling distribution of  $\bar{x}$ ?

- ☐ a. Approximately normal with mean 5.5 days and standard deviation 2.6 days
- ☒ b. Approximately normal with mean 5.5 days and standard deviation 0.26 day
- ☐ c. Strongly skewed to the right with mean 5.5 days and standard deviation 2.6 days
- ☐ d. Strongly skewed to the right with mean 5.5 days and standard deviation 0.026 day
- ☐ e. Strongly skewed to the right with mean 5.5 days and standard deviation 0.26 day



Your answer is correct.

The correct answer is:

Approximately normal with mean 5.5 days and standard deviation 0.26 day

Question **20**

Correct

Mark 1.00 out of 1.00

A population has a proportion of  $p=0.45$ . If a simple random sample of 100 is drawn, what is the probability the sample population  $\bar{p}$  is greater than 0.46 but less than 0.48? That is, what is  $P(0.46 < \bar{p} < 0.48)$ ?

- ☐ a. 0.1589428
- ☐ b. 0.1345592
- ☐ c. 0.1075812
- ☒ d. 0.1470995



Your answer is correct.

The correct answer is:  
0.1470995

Question 21

Incorrect

Mark 0.00 out of 1.00

Data on oxide thickness of semiconductors are as follows: 425, 431, 416, 419, 421, 436, 418, 410, 431, 433, 423, 426, 410, 435, 436, 428, 411, 426, 409, 437, 422, 428, 413, 416. Which the following statement(s) is (are) TRUE?

- ☐ a. The point estimate of the standard deviation of oxide thickness for all wafers in the sample is 9.08
- ☐ b. The point estimate of the variance of oxide thickness for all wafers in the sample is 82.4464
- ☒ c. The point estimate of the mean oxide thickness for all wafers in the population is 423.33
- ☐ d. All of the others.

✗

Your answer is incorrect.

The correct answer is:


All of the others.

Question **22**

Correct

Mark 1.00 out of 1.00

In a national study on transportation patterns, 1,000 randomly selected adults will be asked the question: How many trips per week do you make to the grocery store? The sample mean will be computed. Let  $\mu$  denote the population mean response to the question if everyone in the population is to be asked the question. Is the sample mean  $\bar{x}$  unbiased for estimating  $\mu$ ?

- ☐ a. Yes, because the wording of the question is not biased
- ☐ b. No, because the sample mean  $\bar{x}$  does not always equal the population mean  $\mu$
- ☐ c. Yes, because with a sample size of 1,000 the standard deviation of the sample mean  $\bar{x}$  is small
- ☐ d. No, because number of trips to the grocery store is not normally distributed so the mean (expected value) of the sample mean  $\bar{x}$  does not equal the population mean  $\mu$
- ☒ e. Yes, because for random samples the mean (expected value) of the sample mean  $\bar{x}$  is equal to the population mean  $\mu$  

Your answer is correct.

The correct answer is:

Yes, because for random samples the mean (expected value) of the sample mean  $\bar{x}$  is equal to the population mean  $\mu$

Question 23

Correct

Mark 1.00 out of 1.00

The time for a worker to assemble a component is normally distributed with mean 15 minutes and variance 4. Denote the mean assembly times of 16 day-shift workers and 9 night-shift workers by  $\bar{X}$  and  $\bar{Y}$ , respectively. Assume that the assembly times of the workers are mutually independent. Compute  $P(\bar{X} - \bar{Y} < -1.5)$

Let  $P(Z < -1.9) = 0.0294$ ,  $P(Z < -1.8) = 0.0359$ ,  
 $P(Z < -1.6) = 0.0559$  and  $P(Z < -1.5) = 0.0668$ .

$$\begin{array}{c} \mu = 15 \quad \sigma^2 = 4 \\ \swarrow \quad \searrow \\ n_x = 16 \quad n_y = 9 \\ \bar{X} \quad \bar{Y} \end{array}$$

- ☐ a. 0.0668
- ☐ b. 0.0294
- ☐ c. 0.0559
- ☒ d. 0.0359
- ☐ e. None of the other choices is correct

$$\begin{aligned} &P(\bar{X} - \bar{Y} < -1.5) \\ &= P\left( \frac{(\bar{X} - \bar{Y}) - (\mu - \mu)}{\sqrt{\frac{\sigma^2}{n_x} + \frac{\sigma^2}{n_y}}} < \frac{-1.5 - (\mu - \mu)}{\sqrt{\frac{\sigma^2}{n_x} + \frac{\sigma^2}{n_y}}} \right) \end{aligned}$$

$$= P\left( Z < \frac{-1.5}{\sqrt{\frac{4}{16} + \frac{4}{9}}} \right) = P(Z < -1.8)$$

Your answer is correct.

The correct answer is:  
 0.0359



Question **24**

Partially correct

Mark 0.75 out of 1.00

Data on oxide thickness of semiconductors are as follows: 425, 431, 416, 419, 421, 436, 418, 410, 431, 433, 423, 426, 410, 435, 436, 428, 411, 426, 409, 437, 422, 428, 413, 416.

Which the following statement is TRUE?

- ☐ a. Standard deviation for the population is 9.08 Angstroms.
- ☒ b. Our estimate for the median is 424 Angstroms.
- ☒ c. The mean oxide thickness is 423.33 Angstroms.
- ☒ d. The standard error of the mean is 1.85 Angstroms.



The correct answers are: The mean oxide thickness is 423.33 Angstroms., Standard deviation for the population is 9.08 Angstroms., The standard error of the mean is 1.85 Angstroms., Our estimate for the median is 424 Angstroms.

Question **25**

Correct

Mark 1.00 out of 1.00

Apple would like to estimate the web browsing battery life (in hours) of the Iphone 6. Four users are randomly selected and the battery life are: 4 4 3 5. Using this sample, what is the point estimate for the variance of the battery life?

- ☐ a. 2
- ☒ b. None of the other choice is correct
- ☐ c. 1.4
- ☐ d. 2.5
- ☐ e. 4



Your answer is correct.

The correct answer is:

None of the other choice is correct

