PRINTABLE VERSION

Quiz 9

You scored 100 out of 100

Question 1

Your answer is CORRECT.

As the length of the confidence interval for the population mean decreases, the degree of confidence in the interval's actually containing the population mean

From lecture 14

a) increases

b) does not change

c) decreases

When we increase the size of the sample, the margin of error is decreasing.
As sample size increases the width of the interval decreases (Or the confidence becomes thinner).

Question 2

Your answer is CORRECT.

The gas mileage for a certain model of car is known to have a standard deviation of 6 mi/gallon. A simple random sample of 36 cars of this model is chosen and found to have a mean gas mileage of 28.4 mi/gallon. Construct a 98% confidence interval for the mean gas mileage for this car model.

a) (26.074, 30.726)

b) (14.444, 42.356)

c) (26.346, 30.454)

d) (16.076, 40.724)

e) (28.012, 28.788)

f) None of the above

$n = 36 \quad \sigma = 6$ mi/gal

$\bar{x} = 28.4 \quad C = 0.98$

we know the population standard deviation, so use z-confidence to construct the interval
(see lecture 13)

$$\bar{x} \pm z_{\alpha/2} * \left(\frac{\sigma}{\sqrt{n}}\right)$$

```
> 28.4 + c(-1,1) * qnorm((1+0.98)/2) * (6/sqrt(36))
[1] 26.07365 30.72635
>
```

Question 3

Your answer is CORRECT.

What will increase the width of a confidence interval?

a) Decrease confidence level.

b) Increase confidence level.

From lecture 14

If we lower confidence level, the margin of error also lowers (so the width of the confidence interval decreases).

c) Increase number in sample

d) Decrease variance

Question 4

Your answer is CORRECT.

If the 90% confidence limits for the population mean are 33 and 47, which of the following *could be* the 98% confidence limits

a) (30, 50)

b) (36, 41)

c) (38, 42)

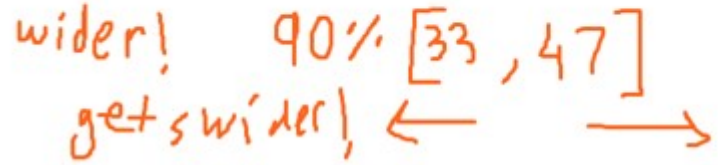
d) (38, 45)

e) (39, 43)

f) None of the above

From lecture 14

When we increase the size of the sample, the margin of error is decreasing.
As sample size increases the width of the interval decreases (Or the confidence becomes thinner).



Question 5

Your answer is CORRECT.

A 95% confidence interval for the mean of a population is to be constructed and must be accurate to within 0.3 unit. A preliminary sample standard deviation is 1.5. The smallest sample size n that provides the desired accuracy is

a) 100

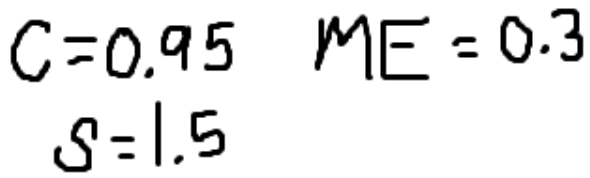
b) 97

c) 94

d) 87

e) 91

f) None of the above



From lecture 14

The formula to calculate the sample size n:
$n > (\frac{z_{\alpha/2} * \sigma}{m})^2$

```
> ((qnorm((1+0.95)/2)*1.5)/0.3)^2
[1] 96.03647
>
```

(remember you always round up)

Question 6

Your answer is CORRECT.

An SRS of 23 students at UH gave an average height of 5.6 feet and a standard deviation of .1 feet. Construct a 90% confidence interval for the mean height of students at UH.

a) (4.100, 7.400)

$n=23 \quad \bar{x}=5.6 \quad S=0.1$

$C=0.90$

b) (5.564, 5.636)

c) (5.428, 5.772)

d) (4.350, 7.050)

e) (5.593, 5.607)

f) None of the above

The *T-confidence interval*, given that the population standard deviation, σ is **unknown**: $\bar{x} \pm t_{\alpha/2, n-1} * (\frac{s}{\sqrt{n}})$

(see slide 4 of lecture 14 slides for examples)

```
> 5.6 + c(-1,1) * qt((1+0.90)/2, 22) * (0.1/sqrt(23))
[1] 5.564195 5.635805
>
```

Question 7

Your answer is CORRECT.

Which test statistic should be used when computing a confidence interval given only the number in a sample, the sample mean and sample standard deviation?

Lecture 14:

a) z

b) t

c) p

d) q

Recall that the confidence interval for population mean, μ, is:

- The *Z-confidence interval* if the population standard deviation, σ is **known**: $\bar{x} \pm z_{\alpha/2} * (\frac{\sigma}{\sqrt{n}})$
- The *T-confidence interval*, given that the population standard deviation, σ is **unknown**: $\bar{x} \pm t_{\alpha/2, n-1} * (\frac{s}{\sqrt{n}})$

Question 8

Your answer is CORRECT.

An important problem in industry is shipment damage. A windshield factory ships its product by truck and determines that it cannot meet its profit expectations if, on average, the number of damaged items per truckload is greater than 12. A random sample of 12 departing truckloads is selected at the delivery point and the average number of damaged items per truckload is calculated to be 11.3 with a calculated sample of variance of 0.49. Select a 99% confidence interval for the true mean of damaged items.

a) (-0.6285, 0.6285)

b) (10.67, 11.93)

c) (10.69, 11.91)

d) (48.26, -30.02)

e) (11.37, 12.63)

f) None of the above

$n=12 \quad \bar{x}=11.3 \quad S^2=0.49$

$C=0.99$

$\bar{x} \pm t_{\alpha/2, n-1} \cdot (\frac{s}{\sqrt{n}})$

```
> 11.3 + c(-1,1) * qt((1+0.99)/2, 11) * (sqrt(0.49)/sqrt(12))
[1] 10.6724 11.9276
>
```

Question 9

Your answer is CORRECT.

The amounts (in ounces) of juice in eight randomly selected juice bottles are:

15.8, 15.6, 15.1, 15.2, 15.1, 15.5, 15.9, 15.5

Construct a 89% confidence interval for the mean amount of juice in all such bottles. Assume an approximate Normal distribution.

a) (15.329, 15.596)

b) (15.264, 15.661)

c) (15.316, 15.609)

d) (15.289, 15.636)

e) None of the above

```
> juice = c(15.8, 15.6, 15.1, 15.2, 15.1, 15.5, 15.9, 15.5)
> mean(juice) + c(-1,1) * qt((1+0.89)/2, 7) * (sd(juice)/sqrt(8))
[1] 15.26406 15.66094
>
```

Question 10

Your answer is CORRECT.

Among 20 golden hamster litters recorded, there was a sample mean of $\bar{x} = 7.72$ baby hamsters, with a sample standard deviation of $s = 2.5$ hamsters per liter. Create a 95% confidence interval for the mean number of baby hamsters per liter.

a) 7.72 ± 1.0957

b) 7.72 ± 1.1700

c) 7.72 ± 0.5590

d) 7.72 ± 0.9666

e) 7.72 ± 2.50

f) None of the above

$n=20 \quad \bar{x}=7.72 \quad s=2.5 \quad C=0.95$

$$\bar{x} \pm t_{\alpha/2,n-1} \cdot \left(\frac{s}{\sqrt{n}}\right)$$

```
> 7.72 + c(-1,1) * qt((1+0.95)/2, 19) * (2.5/sqrt(20))
[1] 6.549964 8.890036
> 8.890036 - 7.72
[1] 1.170036
> 7.72 - 6.549964
[1] 1.170036
>
```

Question 11

Your answer is CORRECT.

Which of the following is not appropriate to use the t-confidence interval for μ.

a) The variable has a Normal distribution.

b) The population standard deviation, σ, is known.

c) The sample size is greater than 30.

d) The sample is based on a simple random sample (SRS).

See lecture 14 notes

e) All of the above are appropriate.

Question 12

Your answer is CORRECT.

A 92% confidence interval for a population parameter means that if a large number of confidence intervals were constructed from repeated samples, then on average, 92% of these intervals would contain the true parameter.

a) False

b) True

See lecture 13 notes

Question 13

Your answer is CORRECT.

Suppose you were told that a 90% confidence interval for the population mean of mpg of a hybrid car was (27, 43). Determine the point estimate for this population mean.

a) 35

b) 27

c) 1.64

d) 43

e) 90

f) None of the above.

$C = 0.90$

$(27, 43)$

If given the lower and upper limit, you can take their average to find $\bar{x}$,

$$\frac{27 + 43}{2}$$

```
> (27+43)/2
[1] 35
>
```

Question 14

Your answer is CORRECT.

Which of the following statements are true?

a) The sample mean is an unbiased estimate of the population mean.

b) The z-critical value is an estimate of the population mean.

See lecture 13 notes

c) The t-critical value is an estimate of the population standard deviation.

d) The sample standard deviation is an unbiased estimate of the population standard deviation.

e) None of the above.