PRINTABLE VERSION

Quiz 10

You scored 100 out of 100

Question 1

Your answer is CORRECT.

The z-score associated with the 89 percent confidence interval is

$z^* = \text{qnorm}\left(\frac{1+CL}{2}\right)$

a) 2.101

b) 1.598

$z^* =$ qnorm(1.89/2)
[1] 1.598193

c) 1.227

d) 1.427

e) 1.257

f) None of the above

Question 2

Your answer is CORRECT.

What will reduce the width of a confidence interval?

a) Decrease confidence level.

b) Decrease number in sample.

c) Increase confidence level.

d) Increase variance.

Question 3

Your answer is CORRECT.

A simple random sample of 49 8th graders at a large suburban middle school indicated that 82% of them are involved with some type of after school activity. Find the margin of error associated with a 99% confidence interval that estimates the proportion of them that are involved in an after school activity.

a) 0.328

b) 0.141

c) 0.191

d) 0.055

e) 0.128

f) None of the above

$n = 49$

$\hat{p} = .82$

CL: .99

$z^* = \text{qnorm}\left(\frac{1.99}{2}\right)$

$z^* =$ qnorm(1.99/2)
[1] 2.575829

$z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$

$2.576 \sqrt{\frac{.82(1-.82)}{49}}$

$= 0.141$

Question 4

Your answer is CORRECT.

A simple random sample of 49 8th graders at a large suburban middle school indicated that 84% of them are involved with some type of after school activity. Find the 98% confidence interval that estimates the proportion of them that are involved in an after school activity.

a) [0.718, 0.762]

b) [0.718, 0.962]

c) [0.638, 0.962]

d) [0.768, 0.773]

e) [0.618, 0.912]

f) None of the above

$n = 49$

$\hat{p} = .84$

CL: .98

$z^* = \text{qnorm}\left(\frac{1.98}{2}\right)$

$z^* =$ qnorm(1.98/2)
[1] 2.326348

$z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$

$2.326 \pm \sqrt{\frac{.84(1-.84)}{49}} = 0.121$

$[.84 - .121, .84 + .121]$

$= [0.718, 0.962]$

Question 5

Your answer is CORRECT.

Mars Inc. claims that they produce M&Ms with the following distributions:

Brown	30%	Red	20%	Yellow	20%
Orange	10%	Green	10%	Blue	10%

A bag of M&Ms was randomly selected from the grocery store shelf, and the color counts were:

Total = 108

$\hat{p} = \frac{22}{108}$

CL = .95

Brown	22	Red	22	Yellow	22
Orange	12	Green	15	Blue	15

Find the 95% confidence interval for the proportion of yellow M&Ms in that bag.

a) [0.128, 0.280]

$z^* = \text{qnorm}\left(\frac{1.95}{2}\right)$

= qnorm(1.95/2)
[1] 1.959964

$z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = (1.96)\sqrt{\frac{.204(1-.204)}{108}}$

$= 0.07596$

b) [0.128, 0.080]

c) [0.178, 0.183]

d) [0.028, 0.230]

$\frac{22}{108} \pm .07596 = [0.128, 0.280]$

e) [0.048, 0.280]

f) None of the above

Question 6

Your answer is CORRECT.

Mars Inc. claims that they produce M&Ms with the following distributions:

Brown	30%	Red	20%	Yellow	20%
Orange	10%	Green	10%	Blue	10%

A bag of M&Ms was randomly selected from the grocery store shelf, and the color counts were:

Total = 115

$\hat{p} = \frac{17}{115}$

Brown	25	Red	22	Yellow	21
Orange	15	Green	17	Blue	15

Find the 99% confidence interval for the proportion of green M&Ms in that bag.

a) [-0.037, 0.183]

$z^* =$ qnorm(1.99/2)
[1] 2.575829

$z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$

b) [0.063, 0.233]

$2.576 \sqrt{\frac{0.15(1-.15)}{115}} = .0853$

c) [-0.017, 0.233]

d) [0.063, 0.033]

$\left(\frac{17}{115} \pm .0853\right) = [0.063, 0.233]$

e) [0.113, 0.118]

f) None of the above

Question 7

Your answer is CORRECT.

Mars Inc. claims that they produce M&Ms with the following distributions:

Brown	30%	Red	20%	Yellow	20%
Orange	10%	Green	10%	Blue	10%

How many M&Ms must be sampled to construct the 98% confidence interval for the proportion of yellow M&Ms in that bag if we want a margin of error of ± .11?

$p = .20$

$z^* =$ qnorm(1.98/2)
[1] 2.326348

shortcut

$$n \geq \frac{\hat{p}(1-\hat{p})}{\left(\frac{ME}{z^*}\right)^2}$$

$$n \geq \frac{(.20)(1-.20)}{\left(\frac{.11}{2.326}\right)^2} = 71.56 \rightarrow \text{round up } \boxed{72}$$

a) 71

b) 72

c) 74

d) 55

e) 56

f) None of the above

Question 8

Your answer is CORRECT.

An experimenter flips a coin 100 times and gets 56 heads. Find the 96.5% confidence interval for the probability of flipping a head with this coin.

$\hat{p} = \frac{56}{100}$

$z^* =$ qnorm(1.965/2)
[1] 2.108358

$$z^*\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 2.108\sqrt{\frac{.56(1-.56)}{100}} = 0.105$$

$$[.56 \pm .105] = [0.455, 0.665]$$

a) [0.355, 0.615]

b) [0.375, 0.665]

c) [0.455, 0.665]

d) [0.505, 0.510]

e) [0.455, 0.465]

f) None of the above

Question 9

Your answer is CORRECT.

Suppose that prior to conducting a coin-flipping experiment, we suspect that the coin is fair. How many times would we have to flip the coin in order to obtain a 90% confidence interval of **width** of at most .16 for the probability of flipping a head?

$$ME = \frac{\text{width}}{2} = \frac{.16}{2} = .08$$

*no p given use $p = 0.5$

$z^* =$ qnorm$\left(\frac{1.9}{2}\right) =$ qnorm(1.9/2)
[1] 1.644854

a) 64

b) 106

c) 111

d) 65

e) 105

f) None of the above

$$n \ge \frac{\hat{p}(1-\hat{p})}{\left(\frac{ME}{z^*}\right)^2} = \frac{(.5)(.5)}{\left(\frac{.08}{1.645}\right)^2} = 105.69$$

↓ round up

$\boxed{106}$

Question 10

Your answer is CORRECT.

It has been observed that some persons who suffer colitis are diagnosed with it again within one year of the first episode. This is due, in part, to damage from the first episode. In order to examine the percentage of the persons who suffer colitis a second time, a random sample of 1000 people who suffered colitis was collected. It was observed that 15 of them again suffered colitis within one year. Select a 95% confidence interval for the true proportion of those who suffer a second episode.

a) [0.0115, 0.0525]

b) [0.00946, 0.0525]

c) [0.00846, 0.0725]

d) [0.00846, 0.0425]

e) [0.00746, 0.0225]

f) None of the above

$n = 1000$

$\hat{p} = \frac{15}{1000}$

$z^* =$ qnorm(1.95/2)
[1] 1.959964

$$z^*\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 1.96\sqrt{\frac{.015(1-.015)}{1000}} = .00753$$

$[.015 \pm .00753]$

$= [0.00746, .0225]$

Question 11

Your answer is CORRECT.

When solving for the sample size required to estimate p to within a particular margin of error, under what circumstances do we use $\hat{p} = .5$?

a) When the variance is equal to .5 or when we desire a most conservative sample size.

b) When the computed value of $\hat{p} = .5$

c) When $\hat{p} = .4$ and $1 - \hat{p} = .6$

d) When we have no prior information on the approximate value of $\hat{p}$ or p.

e) When the margin of error desired is less than or equal to .5

f) None of the above

Question 12

Your answer is CORRECT.

Television viewers often express doubts about the validity of certain commercials. In an attempt to answer their critics, a large advertiser wants to estimate the true proportion of consumers who believe what is shown in commercials. Preliminary studies indicate that about 40% of those surveyed believe what is shown in commercials. What is the minimum number of consumers that should be sampled by the advertiser to be 90% confident that their estimate will fall within 1% of the true population proportion?

$\hat{p} = .4$

$n = ?$

$z^* =$ qnorm(1.9/2)
[1] 1.644854

$mE = .01$

$$n \geq \frac{(\hat{p})(1-\hat{p})}{\left(\frac{mE}{z^*}\right)^2} = \frac{(.4)(1-.4)}{\left(\frac{.01}{1.64}\right)^2}$$

$= 6493.3$

↓

round up

$\boxed{6494}$

a) 6477

b) 6504

c) 6483

d) 6495

e) 6514

f) None of the above

Question 13

Your answer is CORRECT.

An oil company is interested in estimating the true proportion of female truck drivers based in five southern states. A statistician hired by the oil company must determine the sample size needed in order to make the estimate accurate to within 1% of the true proportion with 98% confidence. What is the minimum number of truck drivers that the statistician should sample in these southern states in order to achieve the desired accuracy?

$$n \geq \frac{\hat{p}(1-\hat{p})}{\left(\frac{mE}{z^*}\right)^2} = \frac{.5(1-.5)}{\left(\frac{.01}{2.3263}\right)^2}$$

$mE = .01$

$z^* =$ qnorm(1.98/2)
[1] 2.326348

$n \geq 13526.7 = 13527$

a) 13526

b) 13535

c) 13517

d) 13542

e) 13512

f) None of the above

Question 14

Your answer is CORRECT.

It has been observed that some persons who suffer acute heartburn, again suffer acute heartburn within one year of the first episode. This is due, in part, to damage from the first episode. The performance of a new drug designed to prevent a second episode is to be tested for its effectiveness in preventing a second episode. In order to do this two groups of people suffering a first episode are selected. There are 108 people in the first group and this group will be administered the new drug. There are 170 people in the second group and this group wil be administered a placebo. After one year, 12% of the first group has a second episode and 14% of the second group has a second episode. Select a 99% confidence interval for the difference in true proportion of the two groups.

a) [-0.147, 0.107]

b) [-0.126, 0.086]

c) [-0.107, 0.147]

d) [-0.086, 0.126]

e) [-0.626, 0.586]

f) None of the above

$n_1 = 108$ $\hat{p}_1 = .12$

$n_2 = 170$ $\hat{p}_2 = .14$

$z^* =$

qnorm(1.99/2)
[1] 2.575829

$$(\hat{p}_1 - \hat{p}_2) \pm z^* \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$$

$$(.12 - .14) \pm 2.58 \sqrt{\frac{.12(.88)}{108} + \frac{.14(.86)}{170}}$$