Statistics problems- week 5

1. Consider a population with and . (A) Calculate the z-score for from a sample of size 40. Z = (x- mu sigma = (40-67 5. 76 = -4. 70 (B) Couldthis z-score be used in calculating probabilities using Table 3 in Appendix B of the text? Why or why not?

No, because the maximum z-score that is reported on the table is -3. 4, 3. 4.

(Points : 4)

2. Given a level of confidence of 95% and a population standard deviation of 9, answer the following:

(A) What other information is necessary to find the sample size (n)?

Confidence interval or the margin of error

(B) Find the Maximum Error of Estimate (E) if n = 72. Show all work.

ME = 1. 96(SD/ sqroot(N)) = 1. 96(9/sqroot(72)) = 2. 08

(Points : 4)

3. A sample of 134 golfers showed that their average score on a particular golf course was 87. 43 with a standard deviation of 4. 53.

Answer each of the following (show all work

and state the final answer to at least two decimal places.:

(A) Find the 99% confidence interval of the mean score for all 134 golfers.

CI of 99% = +1. 01 and -1. 01 , 86. 42 < X < 88. 44

(B) Find the 99% confidence interval of the mean score for all golfers if this is a sample of 105 golfers instead of a sample of 134.

CI of 99% = +1. 14 and -1. 14 , 86. 29 < X < 88. 57

(C) Which confidence interval is smaller and why?

The first sample size has a smaller confidence interval because the sample size is bigger. Because the sample size is bigger, the confidence of less error goes down.

(Points : 6)

4. Assume that the population of heights of female college students is approximately normally distributed with mean m of 64. 37 inches and standard deviation s of 6. 26 inches. A random sample of 74 heights is obtained. Show all work.

(A) Find the mean and standard error of the distribution

The mean of xbar is the same as the population mean. = 64. 37

Standard error of xbar = SD/ sqroot(N) = (6. 26/ sqroot(74)) = 0. 728

(B) Find

Z = (X – mu)/ sigma = (65. 25-64. 37)/6. 26 = 0. 141

(Points : 6)

5. The diameters of apples in a certain orchard are normally distributed with a mean of 4. 45 inches and a standard deviation of 0. 42 inches. Show all work.

(A) What percentage of the apples in this orchard is larger than 4. 38 inches?

Z = (X – mu)/sigma = (4. 38 – 4. 45)/0. 42 = -0. 167

Look up using table. Approximately 56. 62% are larger than 4. 38 inches.

(B) A random sample of 100 apples is gathered and the mean diameter is calculated. What is the probability that the sample mean is greater than 4. 38 inches?

Z = (X – mu) /(sigma/sqroot(N)) = (4. 45-4. 38)/(0. 42/sqroot(100)) = 1. 67

Look up using table. Approximately 4. 75% are larger than 4. 38.

(Points : 6)

6. A researcher is interested in estimating the noise levels in decibels at area urban hospitals. She wants to be 95% confident that her estimate is correct.

If the standard deviation is 4. 65, how large a sample is needed to get the desired information to be accurate within 0. 58 decibels? Show all work.

N= (Z*SD/E)2 = (1. 65*4. 65/0. 58)2 = 175

(Points : 6)

1. Consider a normal population with μ = 25 and σ = 7. 0.

(A) Calculate the standard score for a value x of 22.

Z= (X- μ) / σ = (22-25)/7 = -0. 429

(B) Calculate the standard score for a randomly selected sample of 45 with = 22.

Z = (22-25)/(7/sqroot(45)) = -2. 87

(C) Explain why the standard scores of 22 are different between A and B above.

One is taking into account the normal population while the other is looking at a random selection.

(Points : 6)

2. Assume that the mean SAT score in Mathematics for 11th graders across the nation is 500, and that the standard deviation is 100 points. Find the probability that the mean SAT score for a randomly selected group of 150 11th graders is between 480 and 520.

Z = (480-500)/(100/sqroot(480) = -4. 38

Z = (520-500)/(100/sqroot(480) = 4. 38

P = . 9987

(Points : 3)

3. Assume that a sample is drawn and z(α/2) = 1. 65 and σ = 15. Answer the following questions:

(A)If the Maximum Error of Estimate is 0. 04 for this sample, what would be the sample size?

N= (Z*SD/E)2 = ((1. 65*15)/. 04)2 = 382851. 6

(B)Given that the sample Size is 400 with this same z(α/2) and σ, what would be the Maximum Error of Estimate?

E= Z*SD/ sqroot(N) = (1. 65*15) / sqroot(400) = 1. 24

(C)What happens to the Maximum Error of Estimate as the sample size gets larger?

As the sample gets larger, the error gets smaller.

(D)What effect does the answer to C above have to the size of the confidence interval?

As the sample gets larger, the error gets smaller. This means the confidence error shrinks.

(Points : 8)

4. By measuring the amount of time it takes a component of a product to move from one workstation to the next, an engineer has estimated that the standard deviation is 3. 22 seconds.

Answer each of the following (show all work):

(A) How many measurements should be made in order to be 98% certain that the maximum error of estimation will not exceed 0. 5 seconds?

N=(Z*SD/E)2= (2. 05*3. 22/. 5)2 = 174. 3

(B) What sample size is required for a maximum error of 1. 5 seconds?

N=(Z*SD/E)2= (2. 05*3. 22/1. 5)2 = 19. 4

(Points : 6)

5. A 95% confidence interval estimate for a population mean was computed to be (28. 7, 40. 9). Determine the mean of the sample, which was used to determine the interval estimate (show all work).

Xbar – ME = 28. 7

Xbar + ME = 40. 9

2Xbar = 69. 6

Xbar = 34. 8

(Points : 4)

6. A study was conducted to estimate the mean amount spent on birthday gifts for a typical family having two children. A sample of 155 was taken, and the mean amount spent was $209. 67. Assuming a standard deviation equal to $48. 79, find the 99% confidence interval for m, the mean for all such families (show all work).

E = Z*SD/ sqroot(N) = 2. 33*48. 79/sqroot(155) = 9. 13

209. 67 – 9. 13 < X < 209. 67 + 9. 13

200. 54 < X < 218. 80

(Points : 4)

7. A confidence interval estimate for the population mean is given to be (35. 71, 44. 14). If the standard deviation is 13. 045 and the sample size is 52, answer each of the following (show all work):

(A) Determine the maximum error of the estimate, E.

E = Z*SD/ sqroot(N) = 2. 33*13. 045/sqroot(52) = 4. 22

(B) Determine the confidence level used for the given confidence interval.

35. 71-4. 22 < X < 35. 71+4. 22

31. 49 < X < 39. 93

(Points : 4)