**Stat 500 Solution- HW6**

1. *(10 pts)*
2. The population of interest is the lifetime of all of the fuses of that particular kind produced by that manufacturer.
3. The answer to this question is involved in a hypothesis testing because we want to use sample average to know whether the population average is as much as the manufacturer claimed.
4. *(15 pts)*

It is okay to use the 1-proportion z-interval because: (84/125)125>5 AND (1-.672)125>5

b. 90% CI 1 – α = 0.90 ⇒ α = 0.10, α/2 = 0.05 ⇒ zα/2 = z0.05 = 1.645

90% confidence interval: .672 1.645\*(0.04199) = 0.672 ± 0.069 = (0.603, 0.741)

Interpretation of the interval: we are 90% confident that the true proportion of individuals knowledgeable of the product in the population is between .603 and .741.

c. 95% CI 1 – α = 0.95 ⇒ α = 0.05, α/2 = 0.025 ⇒ zα/2 = z0.025 = 1.96

95% confidence interval: =0.672 1.96\*(0.04199) =0.672 0.0823004= (0.5896996, 0.7543004)

Interpretation of the interval: we are 95% confident that the true proportion of individuals knowledgeable of the product in the population is between 0.5896996 and 0.7543004.

The margin of error for the 90% confidence interval is 0.069 and the margin of error for the 95% confidence interval is 0.0823. The 95% confidence interval has a larger margin of error than the 90% confidence interval, which means that the level of precision is lower.

1. *(15 pts)*

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| 90% Confidence Interval Exact Interval:  **Test and CI for One Proportion**  Sample X N Sample p 90% CI Exact P-Value  1 84 125 0.672000 (0.596346, 0.741407) 0.000 |

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| **90% Confidence Interval z-interval:**  **Test and CI for One Proportion**  Test of p = 0.1 vs p not = 0.1  Sample X N Sample p 90% CI Z-Value P-Value  1 84 125 0.672000 (0.602929, 0.741071) 21.32 0.000 |

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| 95% Confidence Interval Exact Interval:  **Test and CI for One Proportion**  Sample X N Sample p 95% CI Exact P-Value  1 84 125 0.672000 (0.582342, 0.753293) 0.000 |

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| **95% Confidence Interval z-interval:**  **Test and CI for One Proportion**  Sample X N Sample p 95% CI Z-Value P-Value  1 84 125 0.672000 (0.589697, 0.754303) 3.85 0.000 |

**4)** *(20pts)*

Use the Conservative Method to guarantee that the sample size will be large enough. = 0.5, E = 0.04; (1-α) = 0.99, α/2 = 0.005, zα/2 = z0.005 = 2.57 （*if you use 2.58, that is fine also, then the sample is 1041）*

⇒ *n* = (zα/2)2(1-)/E2 = [(2.57)2(0.5)(0.5)]/(0.04) 2 = 1032.02

So, 1033 people are needed to guarantee that the sample size will be large enough.

**Using sample size by conservative method has no risk that CI may be too wide. So we would use conservative answer for this problem (plus we want to be guaranteed that it is large enough and not have to go back and sample again).**

**5)** *(20pts)*

**In this problem since the set up cost of sampling more people later on is relatively small compared to sampling extra units, we would use the educated guess.**

Use the Educated Guess Method,.= 0.672, E = 0.04; (1-α) = 0.99, α/2 = 0.005, zα/2 = z0.005 = 2.57 （*if you use 2.58, that is fine also, then the sample is 917）*

⇒ *n* = (zα/2)2(1-)/E2 = [(2.57)2(0.672)(1-0.672)]/(0.04)2 = 909.89

Then 910 people are needed.

1. *(20 pts)*

Because 8(5/8) = 5 and 8(1-)= 3 we cannot use the normal curve to approximate the answer. Instead, we use the exact proportions to derive the confidence interval. Using Minitab, we have the following result.

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| **Test and CI for One Proportion**  Sample X N Sample p 90% CI  1 5 8 0.625000 (0.289241, 0.888887) |

Hence, we can say that there is 90% confidence that the proportion of people wearing eyeglasses will fall between 0.289 and 0.889.