

STAT100 Elementary Statistics and Probability Summer II 2014

Quiz 8, Thursday, August 7, 2014

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Show all work clearly and in order, and circle your final answers. Justify your answers algebraically whenever possible. You are allowed to calculator for basic calculation in this quiz. You have 10 minutes to take this 10 point quiz.

1. (5 points) Assume that the standard deviation of the number of violent incidents in one hour of children's shows on television is 3.2. An investigator would like to be 99% sure that the true mean number of violent incidents per hour is estimated within 1.4 incidents. For how many randomly selected hours does she need to count the number of violent incidents?

$$\sigma = 3.2, \alpha = 1 - 99\% = .01, d = 1.4$$

$$\text{First, we find } z_{\alpha/2} = z_{.005} = \Phi^{-1}(.995) = 2.575$$

Then, use formula

↑ Look up from the Φ -table

$$n \geq \left(\frac{z_{\alpha/2} \sigma}{d} \right)^2 = \left(\frac{2.575 \times 3.2}{1.4} \right)^2 \approx 34.64$$

Therefore, she needs to count at least 35 randomly selected hours.

2. (5 points) 500 random samples are drawn independently from an unknown distribution. The sample mean is 10 and sample variance is 4. Obtain a 90% confidence interval for the population mean μ .

$$n = 500, \bar{X} = 10, S^2 = 4 \Rightarrow S = 2, \alpha = 1 - 90\% = .1$$

$$\text{First, we find } z_{\alpha/2} = z_{.05} = \Phi^{-1}(.95) = 1.645$$

Then, the confidence interval is $\bar{X} \pm z_{\alpha/2} \frac{S}{\sqrt{n}}$

(Note $n=500$, so we can in the case of large sample)

$$\text{Plug in: } \left[10 - 1.645 \cdot \frac{2}{\sqrt{500}}, 10 + 1.645 \cdot \frac{2}{\sqrt{500}} \right]$$

$$= [9.853, 10.147]$$