

Math 341 Homework 8

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Problem 7

(a) I'd really rather not

(b)

$$\alpha = 1 - 0.9 = 0.1$$

$$\alpha/2 = 0.05$$

$$n - 1 = 43 - 1 = 42$$

$$\begin{aligned} t_{\alpha, n-1} &= t_{0.05, 42} \\ &= \text{qt}(0.05, 42, \text{FALSE}) \\ &= -1.681952 \end{aligned}$$

Problem 12

Problem 13

- (a) Binomial Distribution with $n = 100$ and $p = 0.05$ (success being a CI does not contain the mean μ).

(b)

$$\begin{aligned}P(3 \leq X < 8) &= P(X \leq 7) - P(X < 3) \\&= P(X \leq 7) - P(X \leq 2) \\&\approx 0.872039 - 0.1182629 \\&\approx 0.7537765\end{aligned}$$

(c)

$$\begin{aligned}Poisson &\sim Bionmial \\Y &\sim Poisson(np) \\&\sim Poisson(5)\end{aligned}$$

$$\begin{aligned}P(3 \leq Y < 8) &= P(Y \leq 7) - P(Y < 3) \\&= P(Y \leq 7) - P(Y \leq 2) \\&\approx 0.866628 - 0.124652 \\&\approx 0.7419763\end{aligned}$$

- (d) The Poisson approximation is a good approximation for the binomial distribution when n is large and p is small, and the two probabilities reflect this.

Problem 14