Math 318 Homework 6

Xander Naumenko

10/03/23

Question 1a. Define $Y_i = \frac{X-\mu}{\sigma}$. Then the distribution of Y_i is $Y_i = N(0,1)$. Let $Y = \frac{1}{9}\sum_{i=1}^{9} Y_i$, so $\text{Var}[Y] = \frac{1}{9}\sum_{i=1}^{9} 1^2 = \frac{1}{9}$, i.e. the standard deviation is $\frac{1}{3}$. We have that:

$$P(|X - 200| > 5|\sigma = 5) = 2\Phi(-3) = 0.0027.$$

$$P(|X - 200| > 5|\sigma = 10) = 2\Phi(-1.5) = 0.1336.$$

$$P(|X - 200| > 5|\sigma = 15) = 2\Phi(-\frac{1}{3}) = 0.3173.$$

Question 1b. From the probabilities above, case i would be rejected at 5% level of confidence.

Question 1c. Again from the probabilities above, only case i would be rejected at 1% level of confidence.