Homework 4

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Question 1.

Mean amount of summer rainfall for Northeastern : 11.52
20 cities are randomly selected
→ mean : 10.52
sd : 1.5

(1) With 99% confidence level, can it be concluded that the sample mean of rainfall was less than the average in northeastern US?

$\begin{cases} H_0 : \text{The sample mean of rainfall is equal to the average in n.e.} \\ H_1 : \text{The sample mean of rainfall is less than the average in northeastern.} \end{cases}$

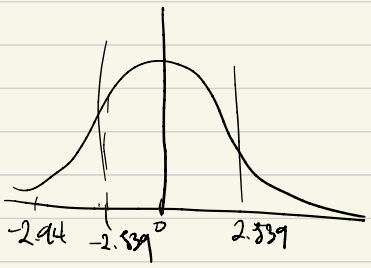
$\mu_0 = 11.52$
$\bar{X} = 10.52$
$S = 1.5$
$n = 20$
$\alpha = 0.01$

$t_{v,\alpha} = 2.539$

$t_c = \frac{\bar{X} - \mu}{S/\sqrt{n}} = \frac{10.52 - 11.52}{1.5/\sqrt{20}}$

$= -2.982$

One-tailed



$\Rightarrow |t_{v,\alpha}| < |t_c|$

∴ Therefore we can reject H_0 (null) and conclude that the sample mean of rainfall was less than the average of northeastern in U.S at 99% confidence level.

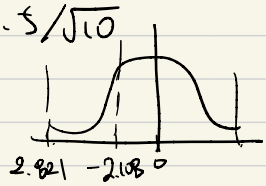
(2) What if the sample mean of rainfall is 10.52, $S = 1.5$ from 10 cities?

$\bar{X} = 10.52$
$S = 1.5$
$n = 10$
$\alpha = 0.01$

$t_{9,0.01} = 2.821$

$t_c = \frac{10.52 - 11.52}{1.5/\sqrt{10}} = -2.108$

$|t_{v,\alpha}| > |t_c|$



⇒ Thus, we cannot reject H_0 (null) and conclude that there is not enough evidence to conclude that the sample mean of rainfall is less than average.