Tutorial Session 8 — Hypothesis Testing (one tailed)

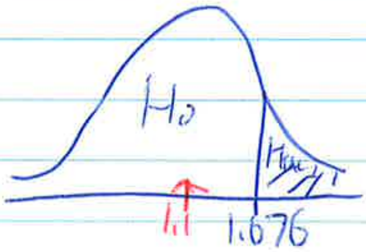
Q10.52 — Salary (P.539) Given $\bar{x} = \$63,500$, $s = \$3,300$, $n = 50$, $\alpha = 0.05$, $\mu = 62,985$

$H_0: \mu = 62,985$

$H_a: \mu > 62,985$

Critical value: $\alpha = 0.05$, $df = 50 - 1 = 49$, t value $\Rightarrow 1.676$

Test value: $t = \dfrac{\bar{x} - \mu}{s/\sqrt{n}} = \dfrac{63,500 - 62,985}{\frac{3,300}{\sqrt{50}}} \approx \dfrac{515}{466.7} \approx 1.1$



$\therefore$ Fail to reject H_0. There is insufficient evident to conclude that the mean salary is greater than \$62,985.

Q10.53 — Big Mac Price (P.539)

Based on the sample data

$\Sigma x_i = 46.32$, $n = 12$, $\bar{x} = \dfrac{\Sigma x_i}{n} = \dfrac{46.32}{12} \approx 3.86$

$\Sigma (x_i - \bar{x})^2 \approx 4.54$, $s = \sqrt{\dfrac{\Sigma (x_i - \bar{x})^2}{(n-1)}} = \sqrt{\dfrac{4.54}{(12-1)}} \approx 0.643$, given $\alpha = 0.05$

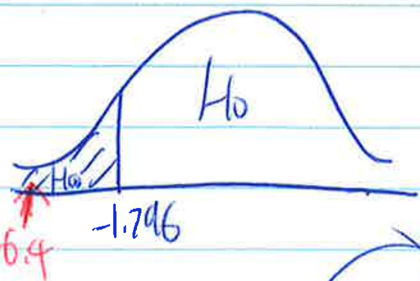
$H_0: \mu = \$5.04$

$H_a: \mu < \$5.04$

Critical value: $\alpha = 0.05$, $df = 12 - 1 = 11$, t-value $\Rightarrow -1.796$

Test value: $t = \dfrac{\bar{x} - \mu}{s/\sqrt{n}} = \dfrac{3.86 - 5.04}{0.64/\sqrt{12}} \approx \dfrac{-1.18}{0.18} \approx -6.4$

$\therefore$ Reject H_0. There is enough evidence to conclude that the mean July 2016 price of a Big Mac in Europe is less than the U.S.



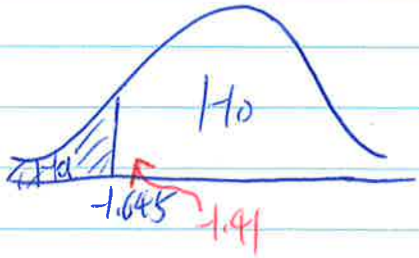
Extra Q1. Given $\bar{x} = 150$, $\sigma = 100$, $n = 200$, $\alpha = 0.05$, $\mu = 160$

$H_0: \mu = 160$

$H_a: \mu < 160$

Critical value

$Z_\alpha = Z_{0.05} \Rightarrow -1.645$



Test value

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{150 - 160}{100/\sqrt{200}} \simeq \frac{-10}{7.07} \simeq -1.41$$

∴ Fail to reject Ho. There is insufficient evidence to conclude that the average mean is less than 160.

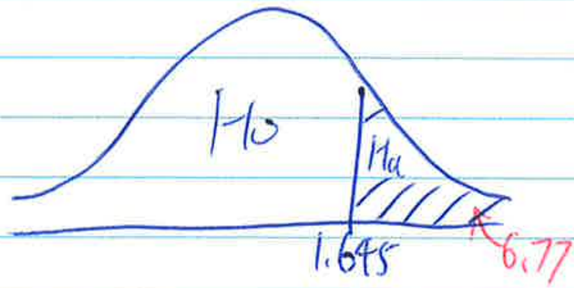
Extra Q2. Given $\bar{x} = 682$, $\sigma = 82.09$, $n = 100$, $\alpha = 0.05$, $\mu = 626.4$

$H_0: \mu = 626.4$

$H_a: \mu > 626.4$

Critical value

$Z_\alpha = Z_{0.05} \Rightarrow 1.645$



Test value

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{682 - 626.4}{82.09/\sqrt{100}} \simeq \frac{55.6}{8.2} \simeq 6.77$$

∴ Reject Ho. There is enough evidence to conclude that the average mean is greater than 626.4