Assignment 14

U20100038

(1) A ⇒ under 10 $\frac{lbs}{oz^2}$

$\bar{X}_A = 58,93$ $|A| = 14$ $S_A = 4,45$

B ⇒ under 20 $\frac{lbs}{oz^2}$

$\bar{X}_B = 57,43$ $|B| = 14$ $S_B = 7,61$

$H_0: \mu_A - \mu_B = 0$

versus

$H_A \Rightarrow \mu_A - \mu_B \neq 0$

C-difference A and B

$X_C = X_A - X_B$

$|C| = 14$

If $\bar{X} = t(X) \Rightarrow \bar{X}_C = \bar{X}_A - \bar{X}_B$ & $S_C^2 = S_A^2 + S_B^2$

degree of freedom = 13

$\bar{X}_C = 58{,}93 - 57{,}43 = 1{,}5$

$S_C = \sqrt{S_A^2 + S_B^2} = \sqrt{4{,}145^2 + 7{,}61^2} \approx 8{,}82$

$\mu_0 \Rightarrow \mu_C = 0 \qquad \mu_A \Rightarrow \mu_C \neq 0$

$t = \frac{\sqrt{14} \cdot (1{,}5 - 0)}{8{,}82} = 3{,}18$

$p \Rightarrow 2 \cdot P(X \geq 3{,}18) \Rightarrow$

$\Rightarrow 2(1 - p(X \leq 3{,}18)) \Rightarrow$

$\Rightarrow 2(1 - 0{,}996) \Rightarrow 2 \cdot 0{,}004 \Rightarrow$

$\Rightarrow 0{,}008.$

p-val $< 0{,}01 \Rightarrow H_0$ can be rejected.

(82) $n = 48 \quad m = 10 \quad \bar{X}_A = 432{,}7 \quad \bar{X}_B = 403{,}5 \quad S_A = 20{,}39 \quad S_B = 15{,}162$

$H_0 \Rightarrow \mu_A - \mu_B \geq 0$ versus $H_A : \mu_A - \mu_B < 0$

$$\gamma = \frac{\left(\frac{20{,}39^2}{48} + \frac{15{,}162^2}{10}\right)^2}{\left(\frac{20{,}39^4}{48^2 \cdot 47} + \frac{15{,}162^2}{900}\right)} = 16{,}13 \Rightarrow 16 \text{ as } \gamma$$

$$t = \frac{\bar{X}_A - \bar{X}_B - 0}{\sqrt{\frac{20{,}39^2}{48} + \frac{15{,}162^2}{10}}} \Rightarrow \frac{432{,}7 - 403{,}5}{\sqrt{111{,}11}} = 5{,}08$$

p-val $= P(X \leq 5{,}08) = 0{,}99\ldots$

p-val $\geq 0{,}1 \Rightarrow H_0$ can be accepted ☺

(8.3) engine 1 – A $n=22$ $\bar{x}_A = 12{,}27$ $s_A = 0{,}38$

engine 2 – B $n=22$ $\bar{x}_B = 12{,}76$ $s_B = 0{,}47$

$\sigma_A^2 = \sigma_B^2$

$$s_p^2 = \frac{21 \cdot 0{,}38^2 + 21 \cdot 0{,}47^2}{42} = 0{,}1827$$

$$s_p = 0{,}135$$

$H_0: \mu_A - \mu_B = 0$ versus $H_A \Rightarrow \mu_A - \mu_B \neq 0$

$$t = \frac{(12{,}27 - 12{,}76 - 0)\sqrt{11}}{0{,}135} \Rightarrow$$

$$\Rightarrow -12{,}04.$$

p-val $\Rightarrow 2 \cdot P(X \geq 1 - 12{,}04) \Rightarrow 2 \cdot P(X \geq 12{,}04) \Rightarrow 2(1 - P(X < 12{,}04)) = 0$

p-val $= 0 \Rightarrow H_0$ can be rejected.