HW7

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Q1 (a) $Z = \dfrac{\bar{X}_n - \mu_0}{\sigma/\sqrt{n}} = \dfrac{113.5-110}{10/4}$

$= 1.4 < Z_{0.05} = 1.645$ So we retain H_0 at 5% level

(b) $Z_{0.1} = 1.29$ $1.4 > 1.29$ So we reject H_0 at 10% level

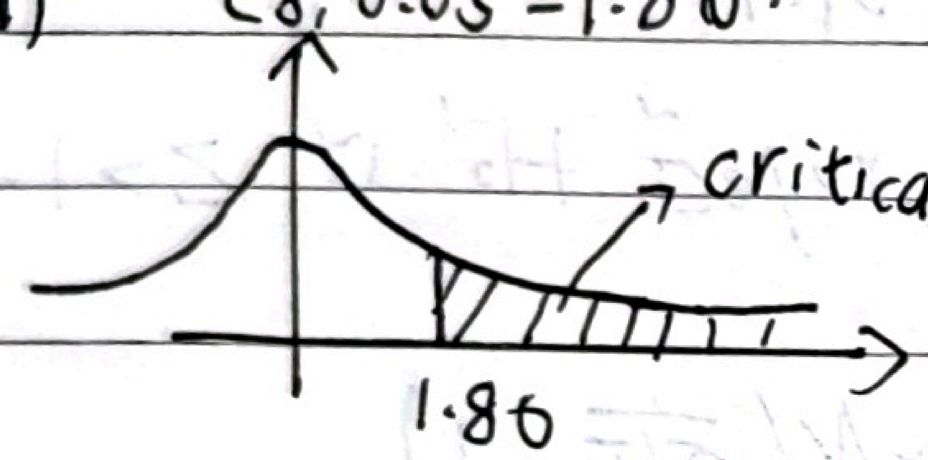
(c) $p \doteq P(Z > 1.4) = 1 - 0.9192 = 0.0808$ P-value is 0.0808.

Q2 (a) $H_0: \mu_0 = 3.4$. where μ_0 is the mean of normal distribution of FVC of volleyball players.

(b) $H_1: \mu_0 > 3.4$

(c) $T(X) = \dfrac{\mu_0 - 3.4}{s.e.(\bar{X}_n)} \sim t_8$. where $s.e.(\bar{X}_n) = \sqrt{\dfrac{\sum_{i=1}^{n}(X_i - \bar{X}_n)^2}{n(n-1)}}$

(d) $t_{8,0.05} = 1.86$. critical region $T(X) \geq 1.86$



critical region is shaded area of 0.05.

Q3.

(a) $T(X,Y) = \dfrac{\bar{X} - \bar{Y} - (\mu_X - \mu_Y)}{S_p\sqrt{\frac{1}{n_X} + \frac{1}{n_Y}}}$ where $S_p = \sqrt{\dfrac{(n_X-1)S_X^2 + (n_Y-1)S_Y^2}{n_X + n_Y - 2}}$

We reject H_0 if $T(X,Y) > t_{0.01, n_X+n_Y-2}$, retained H_0 otherwise

(b) $S_p = \sqrt{\dfrac{15 \times 1356.25 + 12 \times 692.21}{27}} = 32.5791$

$T(X,Y) = \dfrac{415.16 - 347.40}{32.5791\sqrt{\frac{1}{16} + \frac{1}{13}}} = 5.57 > t_{0.01,27} = 2.771$

So we reject H_0 at 1% level

(c) $T(X,Y) = \dfrac{\bar{X} - \bar{Y} - (\mu_X - \mu_Y)}{\sqrt{\frac{S_X^2}{n_X} + \frac{S_Y^2}{n_Y}}}$ where $df = \left[\dfrac{\left(\frac{S_X^2}{n_X} + \frac{S_Y^2}{n_Y}\right)^2}{\frac{(S_X^2/n_X)^2}{n_X-1} + \frac{(S_Y^2/n_Y)^2}{n_Y-1}}\right] = 26$.

$= \dfrac{415.16 - 347.4}{\sqrt{1356.25/16 + 692.21/13}} \approx 5.77 > 2.479 = t_{0.01,26}$

So we reject H_0 at 1% level

Programming Question

Output is t-statistic > 2.8 Conclusion "Reject H0".

P-value = 0.01159892