Solutions to Quantitative Evaluation Tutorial Exercises

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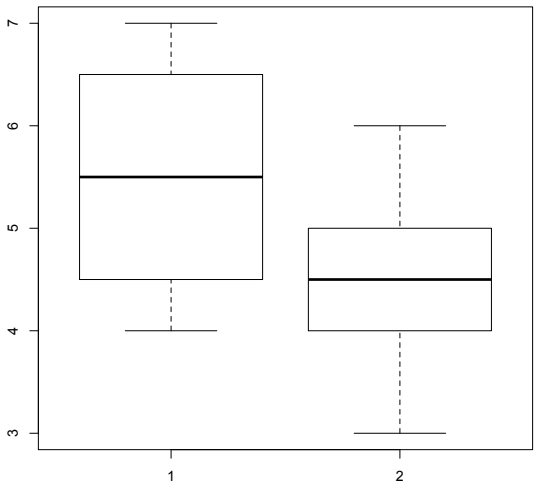


1 Scenario 1

Hypothesis H_0: There is **no significant difference** in efficiency between drop-down menu and pie menu.
H_1: There is **significant difference** in efficiency between drop-down menu and pie menu.

Independent variable Type of menu used

Dependent variable Number of mouse clicks to finish Task A

Population groups **Two** groups of people, each consists of 8. Noted as X_1 and X_2.

Mean $\bar{X}_1 = 5.5$, $\bar{X}_2 = 4.5$

Variance $s_1^2 = 1.428571$, $s_2^2 = 0.8571429$

Pooled variance $s^2_{\bar{X}_1 - \bar{X}_2} = 1.142857$

T value $t = 1.8708, df = 14$

Significant difference? $t = 1.8708 < 2.145$, do not reject H_0.

2 Scenario 2

Hypothesis H_0: There is **no significant performance boost** after taking the drug.
H_1: There is a **significant performance boost** after taking the drug.

Independent variable Pills taken (either drug or placebo).

Dependent variable Time needed to finish programming problem.

Population groups **Two** groups of people, 7 taking the drug and 8 taking placebo. Noted as X_1 and X_2.

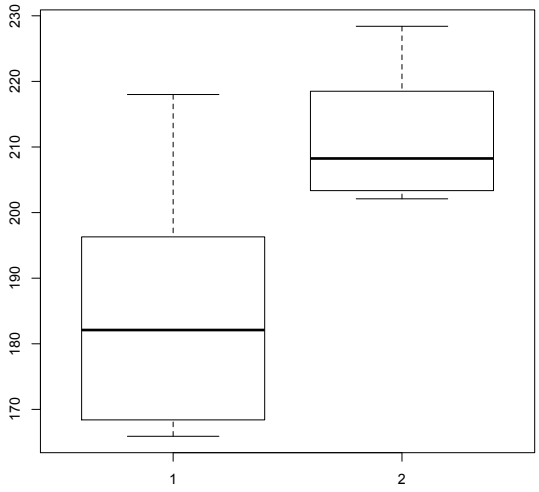
Mean $\bar{X}_1 = 185.0571$, $\bar{X}_2 = 211.3375$

Variance $s_1^2 = 444.3029$, $s_2^2 = 102.2998$

Pooled variance $s^2_{\bar{X}_1-\bar{X}_2} = 260.1474$

T value $t = -3.1483, df = 13$

Significant difference? $t = 3.1483 > 2.16$, reject H_0. Should be one-tail test, so 2.16 should be 1.771.



3 Scenario 3

Hypothesis H_0: There is **no significant difference** in students' test performance after completing the education module.
H_1: There is **significant difference** in students' test performance after completing the education module.

Independent variable Time. Before and after the education.

Dependent variable Students' test scores.

Population groups One groups of 10 people. Scores before and after the education are noted as X_1 and X_2.

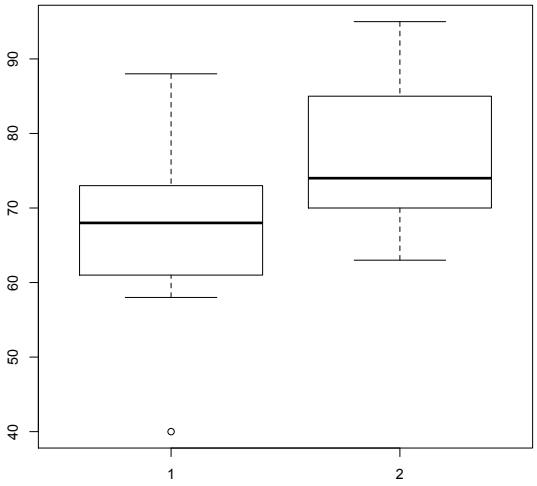
Mean $\bar{X}_1 = 67$, $\bar{X}_2 = 76.4$

Variance $s^2_1 = 176.8889$, $s^2_2 = 97.82222$

Pooled variance $s^2_{\bar{X}_1-\bar{X}_2} = 137.3556$

T value $t = -3.1096, df = 9$

Significant difference? $t = 3.1096 > 1.833$, reject H_0.



4 Scenario 4

5 Interfaces A & B

Hypothesis H_0: There is **no significant difference** in time consumptions finishing a certain task between interface A and B.
H_1: There is **significant difference** in time consumptions finishing a certain task between interface A and B.

Independent variable Interface used.

Dependent variable Task time.

Population groups Two groups of people, each consists of 11. Noted as X_1 and X_2.

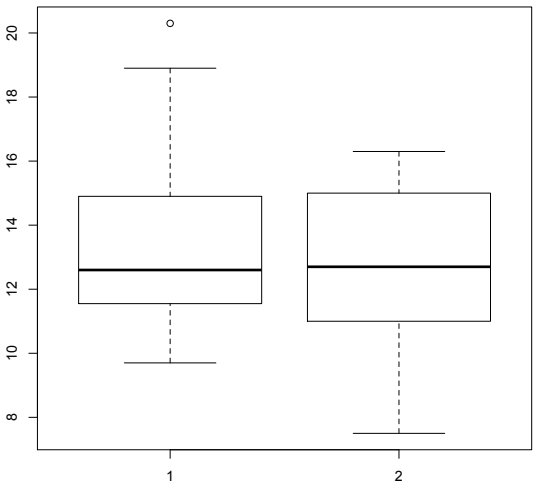
Mean $\bar{X}_1 = 13.67273$, $\bar{X}_2 = 12.68182$

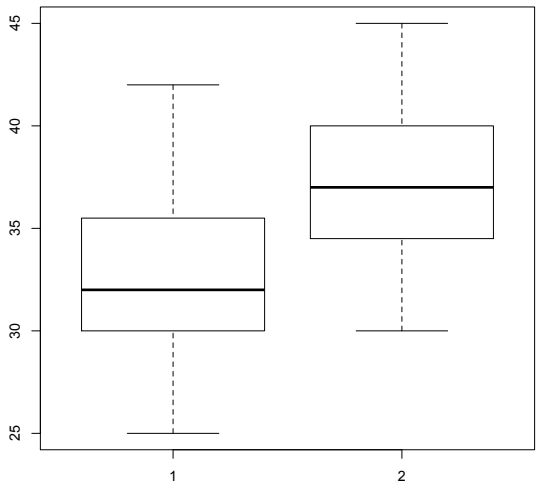
Variance $s^2_1 = 11.58418$, $s^2_2 = 7.229636$

Pooled variance $s^2_{\bar{X}_1-\bar{X}_2} = 9.406909$

T value $t = 0.7577, df = 20$

Significant difference? $t = 0.7577 < 2.086$, do not reject H_0.





6 Manual Typewriter vs Electric Typewriter

Hypothesis H_0: There is **no significant difference** in average words per minute with manual typewriter or with electric typewriter.
H_1: The average words per minute with manual typewriter is **significantly less** than that of electric typewriter.

Independent variable Type of typewriter.

Dependent variable Words per minute typed.

Population groups One groups of 11 people. Words per minute with manual/electric typewriter noted as X_1 and X_2.

Mean $\bar{X}_1 = 32.72727$, $\bar{X}_2 = 37$

Variance $s_1^2 = 20.41818$, $s_2^2 = 19.8$

Pooled variance $s^2_{\bar{X}_1 - \bar{X}_2} = 20.10909$

T value $t = -5.875, df = 10$

Significant difference? $t = 5.875 > 1.812$, reject H_0.