

# MAT-206:00020

Name: Win (Thanawin Pattanaphol)

Student ID: 01324096

1) Value of  $\mu_{SE}$ : 5.678

The results of the one-sample t-test result shows the following:

- a) Test statistics: -0.075657 – as the value is close to the zero, this shows that the sample mean is not very far the hypothesized mean and is very close to the sample mean.
- b) Degrees of freedom: 8
- c) Alternative Hypothesis: Two sided – meaning that the sample mean is either less or more than the hypothesized mean
- d) p-value: 0.941549 – Measure of probability that describes how likely to obtain the observed results but assuming that the null hypothesis is true.
- e) 95% confidence interval means that it is 95% confident that the true population mean is between 5.02 and 6.34.
- f) Cohen's d: 0.025219 – measure of effect size which quantifies the magnitude of the difference between the sample mean and the hypothesized mean in terms of the standard deviations. Here, the number is 0.025 which shoes that the different is very small (shown by the difference between 5.7 and 5.678 to be practically negligible)
- g) Bayes Factor (BF10) 0.322 – represents a weak evidence in favor of the null hypothesis.
- h) Power: 0.050515 – A power 0.05 is extremely low which says that the test does not have a huge ability to detect a difference between the sample mean and the hypothesized mean.

2) Values:

Variance for Southeast Asia:  $\sigma^2_{SE}$ : 0.731

Variance for Latin America & the Caribbean:  $\sigma^2_{LA}$ : 0.194

Levene's test result:

- a) Test Statistic (W): 3.141025
- b) p-value: 0.088534
- c) Equal variance assumption: True

The test results show that, even though, there is a difference in the observed variances, the Levene's test indicates that there is no significant evidence to say that the variances differ largely between the two regions. The p-value does that there is a weak evidence against the null hypothesis for equal variance and the equal variance assumption confirms the assumption that the variances for Southeast Asia and Latin America and the Caribbean are equal.

3) Value of  $\mu_{LA}$ : 6.297

- a) Test statistic: -2.040107
- b) Degrees of freedom: 10.186481
- c) Alternative hypothesis: two-sided
- d) p-value: 0.068122
- e) Confidence interval 95%: Between -1.29 and 0.06
- f) Cohen's d: 1.022676
- g) Bayes' Factor: 1.597
- h) Power: 0.672925

# MAT-206:00020

Name: Win (Thanawin Pattanaphol)

Student ID: 01324096

The test results such as the p-value with the value of 0.068122 is only slightly above the 0.05 significance level shows that there is no statistically significant difference between the values for Southeast Asia and Latin America at the 5% significant level and that the Bayes' factor of 1.597 that suggests a conclusion that the means may not differ that much.

However, there are other parts such as Coden's d of 1.022 that indicates a large effect size (suggesting that there is a significant difference between the two means) and the power if 0.6729 that there is a moderate chance of detecting a true difference.

But overall, there is not enough strong evidence to suggest that the two means are different.

4)

Source	Sums of Squares	Degrees of Freedom	Mean Squares	F-statistic	P-value	Effect size
Continent	90.218922	4	22.554730	34.218881	$1.27 \times 10^{-19}$	0.50718
Within	87.664444	133	0.659131	-	-	-

Continent	Mean Life Ladder
Africa	4.485
America	6.336
Asia	5.433
Europe	6.454
Oceania	7.001

Parameters	Value
Intercontinental Mean ( $\mu$ )	5.621
Intercontinental Variance ( $\tau^2$ )	0.793
Within-Group Variance ( $\sigma^2$ )	0.609

Observation: Based on the ANOVA results, we reject the null hypothesis that the Life Ladder means for all five continents are equal.

The small p-value ( $1.27 \times 10^{-19}$ ) strongly shows that there are significant differences between the means of at least some of the continents. Effect size  $\eta^2=0.50718$  shows a moderate to large difference between the continents.