MAT 243 Final Project Part (3): Summary Report

Final Project Part III

Scenario (B): Solar Power

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**1. Statement of the Problem**

*The power generated in solar farms that are installed in the cities must be analyzed. By doing so, cities with maximum power generation can be identified which will refine the marketing play in order to increase sales of solar panels.*

*The available data for analysis includes five cities where the company has active solar forms. These data include the average monthly solar power generation (in kWh) per panel for 204 months beginning from the year 2000.*

*By using the one-way ANOVA, we will gain some key insight to the differences between the means between two or more populations – should there be any.*

**2. one-way ANOVA**

Table 1. Statistics for City A – five population means

|  |  |
| --- | --- |
| **Statistic** | **Value** |
| Test Statistic | 111.7795 |
| P-Value | 6.1727e-32 |

* *Variable Name: City A*
* *Parameters: data from the months of May to September*
* *Null hypothesis: The five populations means are equal.*
* *Alternative hypothesis: The five populations with unequal means exist.*
* *Level of significance: 0.05*
* *Test Statistic: 111.7795*
* *A p-value that is near 0 (zero) indicates that there is sufficient evidence to conclude that the mean for the 5 populations are not the same.*

*The python function requires the input of five population means in to the f\_oneway() function which will output the test statistics and its p-value.*

Table 2. Statistics for City B – three population means

|  |  |
| --- | --- |
| **Statistic** | **Value** |
| Test Statistics | 161.4834 |
| P-Value | 4.8500e-22 |

* *Variable Name: City B*
* *Parameters: data from the months of July to September*
* *Null hypothesis: The five populations means are equal.*
* *Alternative hypothesis: The five populations with unequal means exist.*
* *Level of significance: 0.01*
* *Test Statistic: 111.7795*
* *A p-value that is near 0 (zero) indicates that there is sufficient evidence to conclude that the mean for the 3 populations are not the same.*

*The python function requires the input of three population means in to the f\_oneway() function which will output the test statistics and its p-value.*

**2. Boxplots**

Figure 1. Statistics for City A – five population means Box Plot

A picture containing screenshot

Description automatically generated

Figure 2. Statistics for City B – five population means Box Plot

A screenshot of a cell phone

Description automatically generated

Inputting the data of each population mean, respectively for City A and City B, into the boxplot function in Python using matplotlib – we arrive with the above two box plots.

**6. Results**

*Based on the p-values for both City A and City B, since both approach 0 (zero) very closely, there is sufficient evidence to reject the null hypotheses that the populations means are equal. This indicates that there is statistical difference in the population means, namely, that the power generation between City A and City B during varying months also may have statistically different power generation means.*

*Additionally, the box plots for both City A and City B with their respective interval of months visibly show that the power generation means of each month differ from the previous or following month. No boxplots for either City A or City B are leveled with one another which usually indicates shared statistics when compared to another boxplot.*