**Name:**

Directions:

* In this project you will be using the **States Data** file that is found in Doc Sharing under the Instructor-Graded Projects:
* Steps for accessing the **States Data** file:
  1. Open your Excel with PhStat2
  2. Click File—Open
  3. Select the **States Data** file
* Not all questions require the use of technology or the **States Date** file.
* You may insert your answers, including any charts, graphs, or output, on this document.
* Be sure to put your name on this document and save it to your computer.

1. Even though independent gasoline stations have been having a difficult time, Susan Solomon has been thinking about starting her own independent gas station. Susan’s problem is to decide how large her station should be. The annual returns will depend on both the size of the station and a number of marketing factors related to oil industry and demand for gasoline. After careful analysis, Susan developed the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| **Size of Gasoline Station** | **Good Market ($)** | **Fair Market ($)** | **Poor Market ($)** |
| **Small** | **$70,000** | **$30,000** | **-$30,000** |
| **Medium** | **$110,000** | **$50,000** | **-$40,000** |
| **Large** | **$170,000** | **$70,000** | **-$50,000** |

1. **Develop a decision table for this decision.**
2. **What is the Maximax decision?**
3. **What is the Maximin decision?**
4. **What is the criterion of realism decision? Use α = 0.6.**
5. **Develop an Opportunity Loss Table**
6. **What is the Minimax Regret Decision?**

2. Data collected on the yearly demand for 50-pound bags of fertilizer at Sunshine Garden Supply are shown in the following table.

|  |  |
| --- | --- |
| Year | Demand for Fertilizer (1,000s of Bags) |
| 1 | 4 |
| 2 | 7 |
| 3 | 5 |
| 4 | 5 |
| 5 | 10 |
| 6 | 7 |
| 7 | 8 |
| 8 | 9 |
| 9 | 11 |
| 10 | 14 |
| 11 | 15 |

**Use Excel QM to:**

1. **Develop a three-year moving average to forecast sales in year 12.**
2. **Develop a 3-year weighted average to predict demand in year 12, in which sales in the most recent year is given a weight of 2 and sales in the two years prior to that are each given a weight of 1.**
3. **Develop a regression/trend line to estimate the demand for fertilizer in year 12.**
4. **Based on the three forecasts you have created, which forecast is the most accurate?**

3. Kaplan College has decided to "wire" its campus. The first stage in this effort is to install the "backbone," i.e., to connect all the buildings. The table below gives the distances between the various buildings on campus in hundreds of feet.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Distances in Hundreds of Feet | | | | | | |
| From | To |  |  |  |  |  |
|  | Building 1 | Building 2 | Building 3 | Building 4 | Building 5 | Building 6 |
| Building 1 |  | **3** | **7** | **5** | **5** | **4** |
| Building 2 |  |  | **5** | **2** | **6** | **6** |
| Building 3 |  |  |  | **5** | **4** | **4** |
| Building 4 |  |  |  |  | **5** | **3** |
| Building 5 |  |  |  |  |  | **4** |
| Building 6 |  |  |  |  |  |  |

1. **How should the buildings be connected to minimize the total length of cable?**
2. **What length of cable is required?**

4. The following represents the distances in miles from a warehouse (node 1) to various cities in Montana. The major outlet store is located at node 7.

|  |  |  |
| --- | --- | --- |
| From Node | To Node | Distance |
| **1** | **2** | **40** |
| **1** | **4** | **100** |
| **2** | **3** | **20** |
| **2** | **4** | **30** |
| **3** | **4** | **60** |
| **3** | **5** | **40** |
| **3** | **6** | **20** |
| **4** | **5** | **70** |
| **4** | **7** | **50** |
| **5** | **6** | **50** |
| **5** | **7** | **80** |
| **6** | **7** | **40** |

1. **Find the shortest route and distance from Node 1 to Node 7.**

5. The network of a city sewer system and their capacities are shown below. Remember that the arc has both capacity and reverse capacity. For example, row 1 is the flow from node 1 to node 2 and row 2 is the reverse flow from node 2 to node 1. There are eight branches in this network.

|  |  |  |
| --- | --- | --- |
| From Node | To Node | Fluid Flow |
| 1 | 2 | 150 |
| 2 | 1 | 100 |
| 1 | 3 | 0 |
| 3 | 1 | 150 |
| 1 | 4 | 300 |
| 4 | 1 | 300 |
| 1 | 5 | 150 |
| 5 | 1 | 100 |
| 2 | 4 | 300 |
| 4 | 2 | 200 |
| 3 | 4 | 250 |
| 4 | 3 | 300 |
| 3 | 5 | 300 |
| 5 | 3 | 250 |
| 4 | 5 | 100 |
| 5 | 4 | 0 |

**Determine the maximum flow (in hundreds of gallons of water per minute) from node 1 to node 5**

6. The governor of Michigan believes that the state can improve the state’s crime rate if the state can reduce the college debt carried by its citizens and if they can increase the percent of the population covered by health insurance.

1. Using the **States Data Set and PHStat**, create the multiple regression prediction equation.
2. Predict the crime rate for Michigan if the college debt were $25,000 and the percent not covered by insurance was 10?

7. A concessionaire for the local ballpark has developed a table of conditional values for the various alternatives (stocking decisions) and states of nature (size of crowd).

|  |  |  |  |
| --- | --- | --- | --- |
| **Stocking Decision** | **Large Crowd ($)** | **Average Crowd ($)** | **Small Crowd ($)** |
| **Large Inventory** | **$22,000** | **$12,000** | **-$2,000** |
| **Average Inventory** | **$15,000** | **$12,000** | **$6,000** |
| **Small Inventory** | **$9,000** | **$6,000** | **$5,000** |

If the probabilities associated with the states of nature are 0.30 for a large crowd, 0.50 for an average crowd, and 0.20 for a small crowd, determine:

1. The alternative that provides the greatest expected monetary value (EMV).
2. The expected value of perfect information (EVPI).

Submitting Your Project

* Save your project in a location that you will remember and with your full name. When you are ready to submit your project, click on the Dropbox and complete the steps below:
* Click the link that says, “Submit an Assignment.”
* In the “Submit to Basket” menu, select Unit 7 Project.
* In the “Comments” field include your name.
* Click the “Add Attachments” button.
* Follow the steps listed to attach your Word Document.
* You should revisit the Dropbox to view any helpful feedback your instructor has and to retrieve your graded project.
* Make sure that you save a copy of your submitted project.