Homework

Mr. Sandy Wiches is trying to decide at which grocery store to shop for the ingredients he needs for his famous sandwiches and related items. There are stores from three supermarket chains fairly close to his home. He decides to use cost, proximity, checkout time, and freshness of produce to make the decision. He measures the distance to each store using his automobile's odometer. Sandy records the time it takes to check out at each store over a one-month period (Sandy eats a lot of sandwiches) and devises a categorical scale to measure the freshness of produce. To measure cost, he decides to price what a "representative shopping basket" would cost at each market. The items he included in his representative shopping basket are included in the list below.

Representative Shopping Basket

1. A gallon of milk
2. A loaf of bread (Wonder)
3. Two pounds of assorted cold-cuts
4. One-half pound of Swiss cheese
5. One-half pound of American cheese
6. A head of lettuce
7. One pound of tomatoes
8. A 16 oz. Bag of potato chips
9. A one pound Hershey bar
10. A bag of OREO cookies
11. A six-pack of Coke (20 oz. bottles)
12. A 13 oz. can of coffee (Maxwell House)

The data Sandy collected are provided in the following table.

Supermarket	**Cost of Food Basket ($)**	**Proximity (miles)**	**Checkout Time (min.)**	**Freshness**
El Chippo	31.80	4.0	20	Acceptable
Sav-a-mint	34.55	2.0	15	Good
El H	36.35	3.0	10	Outstanding

1. Establish a reasonable range of values for each of the numeric measures and define the best and worst possible outcomes. (These do not have to match the observed best and worst values in the table above.)
2. Assign a common unit value of 0 to the worst possible value on each measure and a 1 to the best possible value.
3. Assign proportional common unit values to each numeric measure in the table.
4. The "Freshness" measure is in the form of a verbal category. Since "acceptable" is the worst possible value it receives a score of 0 and "outstanding" is scored a 1. You will need to assign a value between 0 and 1 to "good" that represents the relative importance that you place on that score. Is "good" closer to "acceptable" or closer to "outstanding" in your value system?

5. Enter your common unit values in the table below.

Common Units (0 to 1)

	Food Basket	Proximity	Checkout Time	Freshness
El Chippo				
Sav-a-mint				
Luxor				

6. Use the next table to record the best and worst values of each measure, rank order the measures, and assign points from 0 to 100 to each measure to capture the relative importance of the difference between the best and worst values of that measure. Then use the last column in the table to calculate a weight for each measure.

	Worst	Best	Rank Order	Points	Calculate Weight (Points/Sum)
Food Basket					
Proximity					
Checkout Time					
Freshness					
			Sum=		

7. Finally, in the next table, enter the weight for each measure and use the weights and the common unit values of the measures to compute a total score for each supermarket.

	Weight	El Chippo	Sav-a-mint	Luxor
Food Basket				
Proximity				
Checkout Time				
Freshness				
Total Score				

8. Based on this analysis, where should Sandy shop?

Extensions

You are about to purchase a used car and have decided to apply Multi-Attribute Utility Theory to choose which car to buy.

A. Define the primary objective of your process.
   Suggestions:
   - A reliable vehicle for short distance transportation.
   - A vehicle suitable for long trips to and from college.
   - A fun car for personal use.
   - A vehicle suitable for use in a work environment.

   Now define *your* primary objective.

B. Identify the criteria that will contribute to your selection.
   Suggestions:
   - Cost
   - Number of miles on the odometer
   - Soundness of motor
   - Safety features

   Now create *your own* list.

C. For each criterion, identify one or more measures.
   Now create *your own* measures for each of your criteria.

D. For each measure create a scale. Be careful to use a realistic range.
   Suggestions: Regarding soundness of motor, a categorical scale could be
   - In excellent condition
   - Needs minor repairs
   - Burns oil, but still runs well
   - Starts

E. Collect data on each of the vehicles you are considering.
   It may be appropriate to approach the seller of the vehicle with a list of questions that cover the measures that you have selected.

F. Convert the data on each measure to common units.

G. Create a table of the measures and the vehicles that indicates the scaling of the importance of each measure.

H. Create a second table that will rescale the measures so that there are common units.