Student's Name

School

Course

May 11, 2021

Question 1.

Silicon Valley Transport Commission (SVTC) has a fleet of maintenance vehicles that includes cars, vans, and trucks. SVTC is currently evaluating four different approaches to help them maintain their fleet of cars and vans efficiently at the lowest possible cost. Their options are: (1) No preventive maintenance at all and repair vehicle components when they fail; (2) Take oil samples at regular intervals and perform whatever preventive maintenance is indicated by the oil analysis; (3) Perform an oil change on a regular basis on each vehicle and perform repairs when needed; (4) perform oil changes at regular intervals, take oil samples regularly, and perform maintenance repairs as indicated by the sample analysis.

Option #1 costs nothing to implement and results in two possible outcomes: There is a .10 probability that a defective component will occur, requiring emergency maintenance at a cost of $1,200, or there is a chance that no defects will occur and no maintenance will be necessary.

Option #2 costs $20 to implement, and there is a .10 probability that the maintenance crew will discover a defective part. If the crew actually finds a defective part, there is a .70 probability that the sample will correctly identify it, resulting in preventive maintenance at a cost of $500. However, there is a .30 probability that the sample will not identify the defect and indicate that everything is okay, resulting in emergency maintenance later at a cost of $1,200. On the other hand, if there are actually no defects, there is a .20 probability that the sample will erroneously indicate that there is a defect, resulting in unnecessary maintenance at a cost of $250. There is an .80 probability that the sample will correctly indicate that there are no defects, resulting in no maintenance and no costs.

Option #3 costs $14.80 to implement and has two outcomes: a .04 probability of a defective component, which will require emergency maintenance at a cost of $1,200, and a chance that no defects will occur, hence no need for maintenance and no cost expended.

Option #4 costs $34.80 to implement and results in the same probabilities of defects and no defects as Option #3. If there is a defective component, there is a .70 probability that the sample will detect it and $500 in preventive maintenance costs will be incurred. Alternatively, there is a .30 probability that the sample will not detect the defect, resulting in emergency maintenance at a cost of $1,200. If there is no defect, there is a .20 probability that the sample will indicate that there is a defect, resulting in an unnecessary maintenance cost of $250, and there is an .80 probability that the sample will correctly indicate no defects, resulting in no cost.

Using decision analysis, and only considering the cost, the best decision is option 4

Group of answer choices

Option 1: No preventive maintenance at all and repair vehicle components when they fail.

Option 4: Perform oil changes at regular intervals, take oil samples regularly, and perform maintenance repairs as indicated by the sample analysis. (X)

Cannot be determined.

Option 3: Perform an oil change on a regular basis on each vehicle and perform repairs when needed.

Option 2: Take oil samples at regular intervals and perform whatever preventive maintenance is indicated by the oil analysis.

Question 2.

Silicon Valley Transport Commission (SVTC) has a fleet of maintenance vehicles that includes cars, vans, and trucks. SVTC is currently evaluating four different approaches to help them maintain their fleet of cars and vans efficiently at the lowest possible cost. Their options are: (1) No preventive maintenance at all and repair vehicle components when they fail; (2) Take oil samples at regular intervals and perform whatever preventive maintenance is indicated by the oil analysis; (3) Perform an oil change on a regular basis on each vehicle and perform repairs when needed; (4) perform oil changes at regular intervals, take oil samples regularly, and perform maintenance repairs as indicated by the sample analysis.

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Option #2 costs $20 to implement, and there is a .10 probability that the maintenance crew will discover a defective part. If the crew actually finds a defective part, there is a .70 probability that the sample will correctly identify it, resulting in preventive maintenance at a cost of $500. However, there is a .30 probability that the sample will not identify the defect and indicate that everything is okay, resulting in emergency maintenance later at a cost of $1,200. On the other hand, if there are actually no defects, there is a .20 probability that the sample will erroneously indicate that there is a defect, resulting in unnecessary maintenance at a cost of $250. There is an .80 probability that the sample will correctly indicate that there are no defects, resulting in no maintenance and no costs.

Option #3 costs $14.80 to implement and has two outcomes: a .04 probability of a defective component, which will require emergency maintenance at a cost of $1,200, and a chance that no defects will occur, hence no need for maintenance and no cost expended.

Option #4 costs $34.80 to implement and results in the same probabilities of defects and no defects as Option #3. If there is a defective component, there is a .70 probability that the sample will detect it and $500 in preventive maintenance costs will be incurred. Alternatively, there is a .30 probability that the sample will not detect the defect, resulting in emergency maintenance at a cost of $1,200. If there is no defect, there is a .20 probability that the sample will indicate that there is a defect, resulting in an unnecessary maintenance cost of $250, and there is an .80 probability that the sample will correctly indicate no defects, resulting in no cost.

Using decision analysis, and only considering the cost, the expected value of your best decision is $ 600

Question 3

Silicon Valley Transport Commission (SVTC) has a fleet of maintenance vehicles that includes cars, vans, and trucks. SVTC is currently evaluating four different approaches to help them maintain their fleet of cars and vans efficiently at the lowest possible cost. Their options are: (1) No preventive maintenance at all and repair vehicle components when they fail; (2) Take oil samples at regular intervals and perform whatever preventive maintenance is indicated by the oil analysis; (3) Perform an oil change on a regular basis on each vehicle and perform repairs when needed; (4) perform oil changes at regular intervals, take oil samples regularly, and perform maintenance repairs as indicated by the sample analysis.

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Option #3 costs $14.80 to implement and has two outcomes: a .04 probability of a defective component, which will require emergency maintenance at a cost of $1,200, and a chance that no defects will occur, hence no need for maintenance and no cost expended.

Option #4 costs $34.80 to implement and results in the same probabilities of defects and no defects as Option #3. If there is a defective component, there is a .70 probability that the sample will detect it and $500 in preventive maintenance costs will be incurred. Alternatively, there is a .30 probability that the sample will not detect the defect, resulting in emergency maintenance at a cost of $1,200. If there is no defect, there is a .20 probability that the sample will indicate that there is a defect, resulting in an unnecessary maintenance cost of $250, and there is an .80 probability that the sample will correctly indicate no defects, resulting in no cost.

Using decision analysis, the expected value of Option #1 No maintenance is $ 1800.

Question 4

Silicon Valley Transport Commission (SVTC) has a fleet of maintenance vehicles that includes cars, vans, and trucks. SVTC is currently evaluating four different approaches to help them maintain their fleet of cars and vans efficiently at the lowest possible cost. Their options are: (1) No preventive maintenance at all and repair vehicle components when they fail; (2) Take oil samples at regular intervals and perform whatever preventive maintenance is indicated by the oil analysis; (3) Perform an oil change on a regular basis on each vehicle and perform repairs when needed; (4) perform oil changes at regular intervals, take oil samples regularly, and perform maintenance repairs as indicated by the sample analysis.

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Option #3 costs $14.80 to implement and has two outcomes: a .04 probability of a defective component, which will require emergency maintenance at a cost of $1,200, and a chance that no defects will occur, hence no need for maintenance and no cost expended.

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Using decision analysis, the amount difference between the expected values of Option #3 and Option #4 is $ 1300.

Question 5

Silicon Valley Transport Commission (SVTC) has a fleet of maintenance vehicles that includes cars, vans, and trucks. SVTC is currently evaluating four different approaches to help them maintain their fleet of cars and vans efficiently at the lowest possible cost. Their options are: (1) No preventive maintenance at all and repair vehicle components when they fail; (2) Take oil samples at regular intervals and perform whatever preventive maintenance is indicated by the oil analysis; (3) Perform an oil change on a regular basis on each vehicle and perform repairs when needed; (4) perform oil changes at regular intervals, take oil samples regularly, and perform maintenance repairs as indicated by the sample analysis.

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Using decision analysis, and only considering the cost, the worst decision the company can make for their fleet of trucks is option 1.

Group of answer choices

Cannot be determined.

Option 1: No preventive maintenance at all and repair vehicle components when they fail. (X)

Option 2: Take oil samples at regular intervals and perform whatever preventive maintenance is indicated by the oil analysis.

Option 3: Perform an oil change on a regular basis on each vehicle and perform repairs when needed.

Option 4: Perform oil changes at regular intervals, take oil samples regularly, and perform maintenance repairs as indicated by the sample analysis.

Question 6

Shawna is the marketing manager for Yummy Marinades and Dips. The company wants to should introduce a new cooking sauce product line with the brand Con-Cook-Tions. Shawna is deciding if she would initially do a test market in selected cities on the East Coast or do a big national product launch. The cost of doing the test market is $150,000. If Shawna does the test market, she has to wait for the results of the test market before she decides to do a nationwide launch of Con-Cook-Tions. The probability of a positive response from the test market result is estimated to be 0.6. Alternatively, Shawna could also decide to bypass the test market and go ahead with the national launch. If Con-Cook-Tions is launched nationally and becomes a huge success, the company estimates that it will realize an annual profit of $1.6 million. If the launch fails and the market reacts negatively to the sauces, Yummy will incur a loss of $700,000. Shawna company believes the probability of success for Con-Cook-Tions is 0.50, if the brand is introduced without the test market. If Yummy goes for the test market and the response is enthusiastically positive, then the probability of successfully introducing Con-Cook-Tions nationally increases to 0.8. If the test market response is negative, and Yummy introduces the sauces anyway, the probability of success drops to 0.30.

Should Shawna conduct the test market?

Group of answer choices

No, do not conduct the test market. The expected value of this decision is $450,000.

Yes, conduct the test market. The expected value of this decision is $450,000

No, do not conduct the test market. The expected value of this decision is $1,140,000.

Cannot be determined.

Yes, conduct the test market. The expected value of this decision is $534,000.

Yes, conduct the test market. The expected value of this decision is $654,000. (X)

Question 7

Shawna is the marketing manager for Yummy Marinades and Dips. The company wants to should introduce a new cooking sauce product line with the brand Con-Cook-Tions. Shawna is deciding if she would initially do a test market in selected cities on the East Coast or do a big national product launch. The cost of doing the test market is $150,000. If Shawna does the test market, she has to wait for the results of the test market before she decides to do a nationwide launch of Con-Cook-Tions. The probability of a positive response from the test market result is estimated to be 0.6. Alternatively, Shawna could also decide to bypass the test market and go ahead with the national launch. If Con-Cook-Tions is launched nationally and becomes a huge success, the company estimates that it will realize an annual profit of $1.6 million. If the launch fails and the market reacts negatively to the sauces, Yummy will incur a loss of $700,000. Shawna company believes the probability of success for Con-Cook-Tions is 0.50, if the brand is introduced without the test market. If Yummy goes for the test market and the response is enthusiastically positive, then the probability of successfully introducing Con-Cook-Tions nationally increases to 0.8. If the test market response is negative, and Yummy introduces the sauces anyway, the probability of success drops to 0.30.

The EVPI (Expected Value of Perfect Information) for this problem is $ 450.000

Question 8

Shawna is the marketing manager for Yummy Marinades and Dips. The company wants to should introduce a new cooking sauce product line with the brand Con-Cook-Tions. Shawna is deciding if she would initially do a test market in selected cities on the East Coast or do a big national product launch. The cost of doing the test market is $150,000. If Shawna does the test market, she has to wait for the results of the test market before she decides to do a nationwide launch of Con-Cook-Tions. The probability of a positive response from the test market result is estimated to be 0.6. Alternatively, Shawna could also decide to bypass the test market and go ahead with the national launch. If Con-Cook-Tions is launched nationally and becomes a huge success, the company estimates that it will realize an annual profit of $1.6 million. If the launch fails and the market reacts negatively to the sauces, Yummy will incur a loss of $700,000. Shawna company believes the probability of success for Con-Cook-Tions is 0.50, if the brand is introduced without the test market. If Yummy goes for the test market and the response is enthusiastically positive, then the probability of successfully introducing Con-Cook-Tions nationally increases to 0.8. If the test market response is negative, and Yummy introduces the sauces anyway, the probability of success drops to 0.30.

The EVSI (Expected Value of Sample Information) for this problem is $ 658.000

Question 9

A computer reseller needs to decide how many laptops to order next month. The lowest end laptop costs $220 and the retailer can sell these for $300. However, the laptop manufacturer already announced that they are coming out with a new model in a couple of months. Any laptops that will not be sold by the end of next month will have to be heavily discounted at half-price. The reseller also needs to consider that every time he fails to fulfill a laptop order, he stands to lose $25 for every unit. Based on the past months’ sales, the reseller estimates the demand probabilities for sales (S) as follows: P(0 units) = 0.3; P(1 units) = 0.4; P(2 units) = 0.2; P(3 units) =0.1.

The reseller thinks it’s a good idea to conduct a survey on whether or not his customers are going to buy laptops and how many. The survey results will either be Yes (Y), No (N), or Don’t Know (DK). The probability estimates of the results based on the demand for the number of units are:

P(Y|S = 0 units) = 0.1

P(Y|S = 1 units) = 0.2

P(Y|S = 2 units) = 0.3

P(Y|S = 3 units) = 0.9

P(N|S = 0 units) = 0.8

P(N|S = 1 units) = 0.3

P(N|S = 2 units) = 0.1

P(N|S = 3 units) = 0.1

Determine the reseller's best decision without conducting the survey?

Group of answer choices

Order 4 laptops.

Cannot be determined.

Order 1 laptop.

Order 3 laptops.

Order 2 laptops. – (X )

Do not order any laptops.

Question 10

A computer reseller needs to decide how many laptops to order next month. The lowest end laptop costs $220 and the retailer can sell these for $300. However, the laptop manufacturer already announced that they are coming out with a new model in a couple of months. Any laptops that will not be sold by the end of next month will have to be heavily discounted at half-price. The reseller also needs to consider that every time he fails to fulfill a laptop order, he stands to lose $25 for every unit. Based on the past months’ sales, the reseller estimates the demand probabilities for sales (S) as follows: P(0 units) = 0.3; P(1 units) = 0.4; P(2 units) = 0.2; P(3 units) =0.1.

The reseller thinks it’s a good idea to conduct a survey on whether or not his customers are going to buy laptops and how many. The survey results will either be Yes (Y), No (N), or Don’t Know (DK). The probability estimates of the results based on the demand for the number of units are:

P(Y|S = 0 units) = 0.1

P(Y|S = 1 units) = 0.2

P(Y|S = 2 units) = 0.3

P(Y|S = 3 units) = 0.9

P(N|S = 0 units) = 0.8

P(N|S = 1 units) = 0.3

P(N|S = 2 units) = 0.1

P(N|S = 3 units) = 0.1

If the reseller conducts the survey, what would be the best strategy?

Group of answer choices

Yes: Order 2; No: Order 1: Don't know: Order 1.

Yes: Order 1; No: Order 0: Don't know: Order 2

Yes: Order 2; No: Order 1: Don't know: Order 0.

Yes: Order 2; No: Order 0: Don't know: Order 1.

Cannot be determined.

Yes: Order 3; No: Order 1: Don't know: Order 2. (X)

Yes: Order 3; No: Order 0: Don't know: Order 2.

Question 11

Katie Lee had a car accident and was out of work for a year. Katie's parents believe that the accident was caused by a vehicle defect. Her family consulted some lawyers and planned to sue the vehicle manufacturer for $3.5 million. During negotiations, the legal team of the vehicle manufacturer offered a $700K settlement. Katie's family was advised that they would need to settle the $100K in legal fees if they agree to the settlement. Katie's parents asked their lawyer for advice and their lawyer told them that they have a 50% chance of winning the case. If the decision favors the vehicle manufacturer, Katie's family loses and will have to pay legal fees to the tune of $75K. However, they were cautioned that even the decision favors Katie, the full requested settlement is not guaranteed. The lawyer believes that there is a 50% chance that Katie's family would receive the full settlement amount they requested, of which Katie needs to settle $1.5 million in legal fees. There is a 50% chance that the jury will award Katie  $1 million, of which 50% will be taken up by legal fees.

Which of the following is Katie's best option?

Group of answer choices

Katie should accept the settlement. She will receive $600,000. (X)

Cannot be determined.

Katie should not accept the settlement and sue the company. She will receive $600,000.

Katie should not accept the settlement and sue the company. She will receive $500,000.

Katie should accept the settlement. She will receive $700,000.

Katie should not accept the settlement and sue the company. She will receive $2 million.

Katie should accept the settlement. She will receive $587,500.

Katie should not accept the settlement and sue the company. She will receive $1.25 million.

Question 12

A business owner is planning to strategize his company's growth. He can either buy, rent, or lease a new factory depending on how the business is doing. He was given the following payoff table (amounts in $000s) based on whether the business is doing good or the business is slow.

|  |  |  |
| --- | --- | --- |
| Alternative | Business Doing Good | Business is Slow |
| Probability | .70 | 0.30 |
| Buy | 90 | -10 |
| Rent | 70 | 40 |
| Lease | 60 | 55 |

The probability of business doing good is 0.7 and the probability of slow business is 0.3.

Using Laplace's method, the best strategy is lease

Group of answer choices

Buy

Lease

Cannot be determined.

Rent (X)

Do nothing

Question 13

Consider the following payoff table that represents the profits earned for each alternative (Y1, Y2, and Y3) under the states of nature X1, X2, and X3. Using the maximax criterion, what would be the highest expected payoff?

|  |  |  |  |
| --- | --- | --- | --- |
|  | X1 | X2 | X3 |
| Probability | .65 | .15 | .20 |
| Y1 | 100 | 145 | 120 |
| Y2 | 75 | 125 | 110 |
| Y3 | 95 | 85 | 60 |

Group of answer choices

110

Cannot be determined.

100

125

145 (X)

120

Question 14

Felicidad Ramirez has come of age and now has access to a very substantial trust fund. The trust fund allows her to invest part of the money she will inherit. Felicidad is a multi-awarded pastry chef and has been working as a head baker in one of the trendy bakeries in New Jersey.

With her newfound fortune, Felicidad is now considering opening her own bakery. She wants to start one in Seattle where she was born and raised. However, she also has some friends who believe that she should also open a "twin" branch in New York where they feel her trendy baked goodies would be very well-accepted by the market. Felicidad's friends think that it would be so cool if she could open the two locations at the same time. Felicidad is mulling over her options and is also considering to continue working at her current job and not open her own bakeries.

Felicidad's best friend, Travis, helped her prepare a payoff table to help her analyze the situation.

|  |  |  |  |
| --- | --- | --- | --- |
|  | States of Nature  (amounts are in $'000s) | | |
| Alternatives | Very Favorable | Favorable | Unfavorable |
| Open in Seattle | 380 | 70 | -400 |
| Open in Seattle and New York | 200 | 80 | -200 |

Felicidad believes that there is a 30 percent chance that the market will be unfavorable, a 30 percent chance that it will be favorable, and 40 percent chance it would be very favorable. Travis advised Felicidad that they should hire Manny, a consultant, to help them analyze the market situation in greater detail. Manny mentioned that he provides a money-back guarantee.

The most Felicidad should pay Manny for his services is $350