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**Course Number: MMA 2025S**

**Course Name: MMA 861: Analytical Decision Making**

**Assignment Name: Assignment 1 Individual**

**Due Date: June 22, 2024 9am**

**Team Name: Team Gordon**

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**Question 3**

We are looking to minimize cost to $504,000.00 by optimizing 3 sales representatives assigned to each district to make quota of calls. Each of the four districts this cost includes the fixed cost of $88,000 per district where there is at least one sales representative and then additional $80,000 per sales representative. As well, each sales representative is only allowed to have at most 160 hours allocated to them. We are looking to find the best way to assign sales representatives to each of the districts to minimize cost.

1. ﻿﻿﻿Each Sales Representative has a cost associated with it $88,000 per district if there is at-least one representative and additional $80,000 per representative.
2. ﻿﻿﻿Each representative takes a certain amount of time to make each call and is only allowed to work at most 160 hours.
3. ﻿﻿﻿Each district has a quota for the number of calls District 1: 50 calls, district 2: 80 calls, district 3:  
   100 calls and district :4 60 calls.

Using Simple Linear Programming in excel, we will minimize cost by assigning sales representatives to certain districts: Considering the minimum number of calls to make in each district and the amount of time it takes a representative to make a call.

**Technical Analysis**

1. **Decisions:**

* Variables
  + Xij – number of representatives
    - i = district
    - j = sales representatives
  + Yi – Binary, number of representatives being assigned to a district

1. **Objective:**Minimize total cost while making sure each district has at least district has at least one sales representative.
2. **Objective Function:**

**Cost:**

* Fixed cost if there are 1 or more employees in a district  
  **A black and white math symbol

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* Cost of each representative  
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1. **Constraints:**
2. **Allocated hours per representative**  
     
   1 sales representative = 160
3. **Each district to make quota of calls**

District 1 = X11 + X12 + X13 + X14 >= 50 calls

District 1 = X21 + X22 + X23 + X24 >= 80 calls

District 1 = X31 + X32 + X33 + X34 >= 100 calls

District 1 = X41 + X42 + X43 + X44 >= 60 calls

1. **Non-negative number of calls**  
   Xij >= 0
2. **Integer**  
   Xij and Yi Integer

**Question 4**

We plan to maximize profit to $17,755.56 by producing the right amount of turkey cutlets to sell to fast-food restaurants. This will be done by analyzing the profit of turkey cutlets. As well as some of the constraints of producing turkey cutlets and the amount of white and dark meat.

To maximize profit, we recommend producing 5000 pounds cutlet 1, 3000 pounds of cutlet 867 pounds of Turkey 1 and 322 pounds of Turkey 2. By doing this we will meet the requirement of at least 70% white meat and 30% dark meat. Cutlet 2 has met the requirement of at least 60% white meat and 40% dark meat. The other requirement is the amount of white and dark meat produced from Turkey 1 and 2 must be greater that Cutlet 1 and 2.

Using Simple Linear Programming in excel, we will maximize profit by deciding the right amount of cutlet 1 and 2 as well the amount of turkey 1 and 2. Considering the percentage of dark to white meat and the amount of yield needed for turkey to cutlets.

**Technical Analysis:**

1. **Decisions:**

* Variables
  + X1 – number of pounds produced in Cutlet 1
  + X2 – number of pounds produced in Cutlet 2
  + Y1 – number of pounds produced in Turkey 1
  + Y2 – number of pounds produced in Turkey 2

1. **Objective:**Maximize profit by optimizing the amount of turkey culets to sell to fast-food restaurants.
2. **Objective Function:**

**Cost:**

* Profit = Revenue - Cost  
  + Revenue = 4X1 + 3X2
  + Cost = 10Y1 + 8Y2
  + Profit = 4X1 + 3X2 - 10Y1 + 8Y2

1. **Constraints:**
2. **Non – Negativity of each turkey cutlets**  
     
   X1, X2, Y1, Y2 >= 0
3. **Limit on Cutlets produced**

Cutlet 1 X1 <= 5000

Cutlet 2 X2 <= 3000

1. **Need to Sell Turkey 1**  
   Turkey 1 Y1 >= 100
2. **Amount of White meat**  
     
   White Meat >= 0.70 X1White Meat >= 0.60 X2

White Meat = 5Y1 + 3Y2 >= 0.7X1+0.6X2

1. **Amount of Dark meat**

Dark Meat = 2Y1 + 3Y2 >= 0.3X1+0.4X2

**Appendix**

Question 3

Values:

  
  
Formula:



Question 4

Values



Formula:

