**Student name (                                         )       Student ID (                                            )**

1. Load-Distance exercise

Management is investigating which location would be best to position its new plant relative to three suppliers (located in A, B, and C) and four market areas (D, E, F, and G). Management has limited the search for this plant to those seven locations. The following information has been collected. Which is best, assuming rectilinear distance?

|  |  |  |
| --- | --- | --- |
| Location | x,y coordinates | Trips/year |
| A | 10,10 | 20 |
| B | 8,13 | 30 |
| C | 11,7 | 20 |
| D | 4,15 | 25 |
| E | 15,6 | 30 |
| F | 12,8 | 35 |
| G | 7,10 | 40 |

|  |  |  |
| --- | --- | --- |
| Location |  | *ld* score |
| A | = | = |
| B | = | = |
| C | = | = |
| D | = | = |
| E | = | = |
| F | = | = |
| G | = | = |

**Answer ( )**

(Round up/down to the one decimal places. e.g. 11.11 → 11.1, 11.77 → 11.8)

**Student name (                                         )       Student ID (                                            )**

2. Centre of Gravity exercise

Management is investigating which location would be best to position its new plant relative to three suppliers (located in A, B, and C) and four market areas (D, E, F, and G). What is the centre of gravity, assuming rectilinear distance?

|  |  |  |
| --- | --- | --- |
| Location | Tons Shipped | x,y coordinates |
| A | 1000 | 10,10 |
| B | 1700 | 8,13 |
| C | 13500 | 11,7 |
| D | 800 | 4,15 |
| E | 34800 | 15,6 |
| F | 500 | 12,8 |
| G | 22000 | 7,10 |

***x*\* = =**

***y*\* = =**

where *di*  = |*xi* – *x\**| + |*yi* – *y\**|

*ld* = =

(Round up/down to the one decimal places. e.g. 11.11 → 11.1, 11.77 → 11.8)

**Student name (                                         )       Student ID (                                            )**

3. Break-even analysis exercise

An operations manager narrowed the search for a new facility location to four communities. The annual fixed costs (land, property taxes, insurance, equipment, and buildings) and the variable costs (labour, materials, transportation, and variable overhead) are as follows. Plot the total cost curves and calculate the break-even quantities if the expected demand varies between 0 ~ 1000.

|  |  |  |
| --- | --- | --- |
| Community | Fixed Costs | Variable Costs per Unit |
| A | $15,000 | $48 |
| B | $20,000 | $32 |
| C | $30,000 | $20 |
| D | $40,000 | $30 |

|  |  |  |  |
| --- | --- | --- | --- |
| Community | Fixed Costs | Variable Costs per Unit  (Cost per Unit)(No. of Units) | Total Cost  (Fixed + Variable) |
| A | $15,000 | $48 |  |
| B | $20,000 | $32 |  |
| C | $30,000 | $20 |  |
| D | $40,000 | $30 |  |

(Total Cost)

80000

40000

0 1000 Q

(you can either draw the plot by hand or use other programme and copy it)

Break even quantity between ( ) and ( ) = ( )

Break even quantity between ( ) and ( ) = ( )

(Round up/down to the one decimal places. e.g. 11.11 → 11.1, 11.77 → 11.8)