**Output 1 : When Default Values**

Enter the width x of the sensor network (default: 2000): 2000

Enter the length y of the sensor network (default: 2000): 2000

Enter the number of sensor nodes (default: 100): 100

Enter the transmission range in meters (default: 400): 400

Enter the number of DNs (default: 50): 50

Enter the maximum number of data packets each DN has (default: 1000): 1000

The Graph is Connected

Minimum Spanning Tree

A picture containing art, colorfulness, symmetry

Description automatically generated

A screenshot of a computer screen

Description automatically generated with low confidence

DNs and their data packets:

DN 80: 634 data packets

DN 1: 614 data packets

DN 36: 331 data packets

DN 83: 874 data packets

DN 16: 543 data packets

DN 15: 440 data packets

DN 46: 599 data packets

DN 43: 945 data packets

DN 74: 61 data packets

DN 2: 827 data packets

DN 30: 684 data packets

DN 6: 293 data packets

DN 86: 221 data packets

DN 56: 38 data packets

DN 0: 657 data packets

DN 26: 497 data packets

DN 33: 895 data packets

DN 40: 600 data packets

DN 69: 131 data packets

DN 78: 236 data packets

DN 10: 149 data packets

DN 5: 209 data packets

DN 51: 964 data packets

DN 53: 21 data packets

DN 82: 289 data packets

DN 48: 582 data packets

DN 84: 531 data packets

DN 58: 280 data packets

DN 75: 176 data packets

DN 35: 52 data packets

DN 21: 999 data packets

DN 65: 452 data packets

DN 28: 77 data packets

DN 24: 525 data packets

DN 13: 334 data packets

DN 8: 266 data packets

DN 97: 600 data packets

DN 55: 512 data packets

DN 57: 221 data packets

DN 62: 574 data packets

DN 91: 650 data packets

DN 45: 731 data packets

DN 9: 206 data packets

DN 17: 958 data packets

DN 64: 46 data packets

DN 93: 629 data packets

DN 39: 972 data packets

DN 60: 512 data packets

DN 73: 134 data packets

DN 12: 836 data packets

Details for Greedy 1 Algorithm

Route: [0, 19, 70, 0]

Cost: 438.1231360868138

Total Prizes: 2365.0538226296335

Remaining Budget: 168.73630110693276

Running time: 0.0000000 seconds

Details for Greedy 2 Algorithm

Route: [0, 19, 70, 0]

Cost: 438.1231360868138

Total Prizes: 2365.0538226296335

Remaining Budget: 168.73630110693276

Running time: 0.0000000 seconds

Details for MARL Algorithm

Route: [19, 61, 0]

Cost: 546.4221733651611

Total Prizes: 1686.2899476913158

Remaining Budget: 74.52660385545414

Running time: 163.0856209 seconds

**Output 2 :**

Enter the width x of the sensor network (default: 2000): 50

Enter the length y of the sensor network (default: 2000): 50

Enter the number of sensor nodes (default: 100): 50

Enter the transmission range in meters (default: 400): 15

Enter the number of DNs (default: 50): 10

Enter the maximum number of data packets each DN has (default: 1000): 20

The Graph is Connected

Minimum Spanning Tree

A picture containing art, cube, origami

Description automatically generated

A picture containing diagram, line, colorfulness, screenshot

Description automatically generated

DNs and their data packets:

DN 25: 7 data packets

DN 9: 3 data packets

DN 12: 11 data packets

DN 33: 17 data packets

DN 17: 5 data packets

DN 37: 21 data packets

DN 29: 7 data packets

DN 24: 18 data packets

DN 49: 9 data packets

DN 20: 15 data packets

Details for Greedy 1 Algorithm

Route: [0, 11, 2, 0]

Cost: 21.39588555243554

Total Prizes: 51.06347744477638

Remaining Budget: 4.29887425622708

Running time: 0.0106914 seconds

Details for Greedy 2 Algorithm

Route: [0, 11, 2, 0]

Cost: 21.39588555243554

Total Prizes: 51.06347744477638

Remaining Budget: 4.29887425622708

Running time: 0.0000000 seconds

Details for MARL Algorithm

Route: [11, 2, 0]

Cost: 21.39588555243554

Total Prizes: 31.7166959588214

Remaining Budget: 4.29887425622708

Running time: 56.4448910 seconds

**Output 3 :**

**Text, letter

Description automatically generated**

**Output 4:**

Enter the width x of the sensor network (default: 2000): 1000

Enter the length y of the sensor network (default: 2000): 1000

Enter the number of sensor nodes (default: 100): 50

Enter the transmission range in meters (default: 400): 200

Enter the number of DNs (default: 50): 25

Enter the maximum number of data packets each DN has (default: 1000): 500

The Graph is Connected

Minimum Spanning Tree

A picture containing line, colorfulness, origami

Description automatically generated

A picture containing colorfulness, line, diagram

Description automatically generated

DNs and their data packets:

DN 10: 432 data packets

DN 0: 21 data packets

DN 9: 38 data packets

DN 4: 196 data packets

DN 44: 196 data packets

DN 39: 211 data packets

DN 35: 248 data packets

DN 33: 371 data packets

DN 42: 486 data packets

DN 46: 182 data packets

DN 49: 243 data packets

DN 41: 231 data packets

DN 11: 91 data packets

DN 31: 466 data packets

DN 7: 496 data packets

DN 6: 24 data packets

DN 48: 305 data packets

DN 23: 157 data packets

DN 36: 90 data packets

DN 8: 428 data packets

DN 27: 199 data packets

DN 15: 277 data packets

DN 12: 115 data packets

DN 24: 497 data packets

DN 13: 315 data packets

Details for Greedy 1 Algorithm

Route: [0, 44, 0]

Cost: 110.03629918775582

Total Prizes: 627.6204833769061

Remaining Budget: 144.98185040612208

Running time: 0.0000000 seconds

Details for Greedy 2 Algorithm

Route: [0, 44, 0]

Cost: 110.03629918775582

Total Prizes: 627.6204833769061

Remaining Budget: 144.98185040612208

Running time: 0.0000000 seconds

Details for MARL Algorithm

Route: [33, 0]

Cost: 224.8063318847814

Total Prizes: 231.55033631846555

Remaining Budget: 87.5968340576093

Running time: 58.4621990 seconds

**Output 5 : When Data is more than default MARL did not work**

Enter the width x of the sensor network (default: 2000): 2000

Enter the length y of the sensor network (default: 2000): 2000

Enter the number of sensor nodes (default: 100): 200

Enter the transmission range in meters (default: 400): 600

Enter the number of DNs (default: 50): 75

Enter the maximum number of data packets each DN has (default: 1000): 2000

The Graph is Connected

Minimum Spanning Tree

A picture containing child art, graphics, colorfulness, screenshot

Description automatically generated

A picture containing colorfulness

Description automatically generated

DNs and their data packets:

DN 181: 636 data packets

DN 92: 752 data packets

DN 175: 1053 data packets

DN 188: 1543 data packets

DN 71: 1052 data packets

DN 110: 1222 data packets

DN 147: 1317 data packets

DN 47: 742 data packets

DN 75: 99 data packets

DN 54: 81 data packets

DN 130: 1281 data packets

DN 162: 778 data packets

DN 107: 176 data packets

DN 81: 288 data packets

DN 70: 912 data packets

DN 85: 851 data packets

DN 94: 1272 data packets

DN 186: 1669 data packets

DN 24: 672 data packets

DN 99: 1420 data packets

DN 38: 1621 data packets

DN 83: 69 data packets

DN 84: 1125 data packets

DN 48: 286 data packets

DN 198: 1503 data packets

DN 101: 1915 data packets

DN 193: 814 data packets

DN 128: 703 data packets

DN 97: 1644 data packets

DN 21: 259 data packets

DN 117: 431 data packets

DN 78: 1032 data packets

DN 39: 1647 data packets

DN 76: 1502 data packets

DN 35: 1878 data packets

DN 143: 1250 data packets

DN 165: 6 data packets

DN 158: 1105 data packets

DN 132: 463 data packets

DN 161: 1074 data packets

DN 133: 1687 data packets

DN 86: 1933 data packets

DN 45: 1832 data packets

DN 33: 819 data packets

DN 49: 1294 data packets

DN 118: 1817 data packets

DN 176: 209 data packets

DN 131: 1028 data packets

DN 72: 1509 data packets

DN 194: 349 data packets

DN 157: 1930 data packets

DN 80: 1438 data packets

DN 111: 1970 data packets

DN 79: 934 data packets

DN 7: 1889 data packets

DN 69: 1246 data packets

DN 144: 409 data packets

DN 109: 1638 data packets

DN 196: 289 data packets

DN 179: 1112 data packets

DN 195: 543 data packets

DN 171: 126 data packets

DN 12: 1975 data packets

DN 6: 1609 data packets

DN 142: 564 data packets

DN 172: 951 data packets

DN 121: 1983 data packets

DN 1: 1371 data packets

DN 156: 291 data packets

DN 124: 1620 data packets

DN 164: 667 data packets

DN 15: 823 data packets

DN 60: 807 data packets

DN 173: 597 data packets

DN 4: 284 data packets

Details for Greedy 1 Algorithm

Route: [0, 161, 138, 124, 118, 0]

Cost: 650.6653335972817

Total Prizes: 6608.1319005954065

Remaining Budget: 273.9730730772798

Running time: 0.0000000 seconds

Details for Greedy 2 Algorithm

Route: [0, 161, 138, 124, 118, 0]

Cost: 650.6653335972817

Total Prizes: 6608.1319005954065

Remaining Budget: 273.9730730772798

Running time: 0.0055077 seconds

**Output 6:**

Enter the width x of the sensor network (default: 2000): 1250

Enter the length y of the sensor network (default: 2000): 1250

Enter the number of sensor nodes (default: 100): 69

Enter the transmission range in meters (default: 400): 248

Enter the number of DNs (default: 50): 25

Enter the maximum number of data packets each DN has (default: 1000): 399

The Graph is Connected

Minimum Spanning Tree

**A picture containing line, origami

Description automatically generated**

**A picture containing colorfulness, line

Description automatically generated**

DNs and their data packets:

DN 22: 130 data packets

DN 42: 395 data packets

DN 29: 229 data packets

DN 50: 315 data packets

DN 63: 155 data packets

DN 51: 98 data packets

DN 31: 284 data packets

DN 6: 228 data packets

DN 45: 120 data packets

DN 8: 222 data packets

DN 68: 262 data packets

DN 64: 330 data packets

DN 30: 246 data packets

DN 11: 130 data packets

DN 38: 297 data packets

DN 39: 103 data packets

DN 59: 240 data packets

DN 33: 147 data packets

DN 49: 224 data packets

DN 15: 384 data packets

DN 48: 216 data packets

DN 58: 110 data packets

DN 66: 231 data packets

DN 20: 196 data packets

DN 25: 289 data packets

Details for Greedy 1 Algorithm

Route: [0, 4, 40, 0]

Cost: 149.44489235784982

Total Prizes: 1101.3316998236594

Remaining Budget: 141.7406755268919

Running time: 0.0000000 seconds

Details for Greedy 2 Algorithm

Route: [0, 4, 40, 0]

Cost: 149.44489235784982

Total Prizes: 1101.3316998236594

Remaining Budget: 141.7406755268919

Running time: 0.0000000 seconds

Details for MARL Algorithm

Route: [40, 4, 25, 0]

Cost: 325.011102356629

Total Prizes: 1050.0360966803069

Remaining Budget: 42.09004300728748

Running time: 77.6900220 seconds