# Question 1

For all parts of Question 1, repeated states are ignored as per the assignment instructions, therefore optimality is no longer guaranteed.

1. **Uniform Cost Search**

Form: ng(n), where n is the city number, and g(n) is the actual travel distance from city 1 to city n.

|  |  |  |
| --- | --- | --- |
| **Expanded Node** | **Open Queue** | **Closed Queue** |
|  | { 10 } |  |
| 10 | { 55 824 } |  |
| 55 | { 824 640 } | { 10 } |
| 824 | { 1039 640 347 } | { 10 55 } |
| 1039 | { 640 347 965 } | { 10 55 824 } |
| 640 | { 347 965 278 } | { 10 55 824 1039 } |
| 347 | { 454 965 278 } | { 10 55 824 1039 640 } |
| 454 | { 965 278 } | { 10 55 824 1039 640 347 } |
| 965 | { 278 7100 } | { 10 55 824 1039 640 347 454 } |
| 278 | { 7100 } | { 10 55 824 1039 640 347 454 965 } |
| 7100 | { } | { 10 55 824 1039 640 347 454 965 278 } |

Path: 1 🡪 8 🡪 10 🡪 9 🡪 7

Cost: 100

1. **Greedy Best First Search**

Form: nh(n), where n is the city number, and h(n) is an estimate of distance from city n to city 7.

|  |  |  |
| --- | --- | --- |
| **Expanded Node** | **Open Queue** | **Closed Queue** |
|  | { 178 } |  |
| 178 | { 860 575 } |  |
| 860 | { 337 1057 575 } | { 178 } |
| 337 | { 430 1057 575 } | { 178 860 } |
| 430 | { 935 1057 575 } | { 178 860 337 } |
| 935 | { 70 232 1057 660 575 } | { 178 860 337 430 } |
| 70 | { 232 1057 660 575 } | { 178 860 337 430 935 } |

Path: 1 🡪 8 🡪 3 🡪 4 🡪 9 🡪 7

Cost: 107

1. **A\* Search**

Form: ng(n)+h(n), where n is the city number, g(n) is the actual travel distance from city 1 to city n, and h(n) is an estimate of distance from city n to city 7.

|  |  |  |
| --- | --- | --- |
| **Expanded Node** | **Open Queue** | **Closed Queue** |
|  | { 178 } |  |
| 178 | { 580 884 } |  |
| 580 | { 884 6100 } | { 178 } |
| 884 | { 384 1096 6100 } | { 178 580 } |
| 384 | { 484 1096 6100 } | { 178 580 884 } |
| 484 | { 1096 6100 9107 } | { 178 580 884 384 } |
| 1096 | { 6100 9107 } | { 178 580 884 384 484 } |
| 6100 | { 9107 2110 } | { 178 580 884 384 484 1096 } |
| 9107 | { 7107 2110 } | { 178 580 884 384 484 1096 6100 } |
| 7107 | { 2110 } | { 178 580 884 384 484 1096 6100 9107 } |

Path: 1 🡪 8 🡪 3 🡪 4 🡪 9 🡪 7

Cost: 107

# Question 2

# Question 3

# Question 4