Name: Date:

Traveling Salesman Problem Student Handout

The TSP asks us to find the shortest route traveled along a given set of points and the distances between those points without revisiting any point.

For example take the following points, A,B,C, and D:

7 mi.

6 mi.

8 mi.

10 mi.

12 mi.

10 mi.

D

C

A

B

1. List the possible routes to travel and their distances:

1)

2)

3)

4)

5)

6)

2. How many permutations can be made with routes of the 4 points?

3. Fill in the table below with the possible permutations:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | A | A | A | A | A |
| B | B | B | B | B | B |
| C | C | C | C | C | C |
| D | D | D | D | D | D |

4. Fill in the values missing from the table below and answer the following questions:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ABCD=26 | ABDC= | ACBD=25 | ACDB=25 | ADBC= | ADCB= |
| BACD= | BADC= | BCAD=28 | BCDA= | BDAC=27 | BDCA=25 |
| CABD= | CADB=27 | CBAD=28 | CBDA=29 | CDAB=28 | CDBA= |
| DABC=28 | DACB=30 | DBAC= | DBCA=25 | DCAB= | DCBA=26 |

What is(are) the shortest possible route(s)?

How long is the longest possible route?

What are some real world applications for the TSP?