# More on HW7: The Two Traveling Salesmen Problem

**Hints:**

## Examples:

Let $G$ have $n$ vertices, named $1, 2, \ldots n$, in topological order. Thus, there is no edge $(i, j)$ if $i \geq j$.

**Example 1:** Let $n = 20$, and let $G$ be a complete acyclic directed graph, *i.e.,* there is an edge from $i$ to $j$ if and only if $i < j$. Let the weights $\{W(i, j)\}$ be given by the following table; for example, $W(1, 2) = 5$. A blank entry means that $W(i, j)$ is undefined, or $\infty$ if you prefer.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 5 | 6 | 7 | 8 | 6 | 8 | 5 | 8 | 4 | 6 | 6 | 4 | 4 | 3 | 9 | 1 | 9 | 3 | 4 |
| 2 | | | 5 | 8 | 8 | 5 | 5 | 6 | 4 | 9 | 8 | 1 | 4 | 1 | 6 | 1 | 4 | 8 | 9 | 8 |
| 3 | | | | 2 | 8 | 8 | 9 | 5 | 8 | 8 | 5 | 5 | 8 | 7 | 2 | 7 | 6 | 6 | 2 | 5 |
| 4 | | | | | 9 | 7 | 5 | 1 | 4 | 5 | 3 | 2 | 7 | 7 | 5 | 2 | 6 | 2 | 1 | 3 |
| 5 | | | | | | 6 | 2 | 6 | 3 | 6 | 4 | 9 | 9 | 7 | 5 | 4 | 6 | 4 | 9 | 7 |
| 6 | | | | | | | 1 | 1 | 9 | 7 | 6 | 7 | 2 | 2 | 4 | 2 | 7 | 3 | 6 | 4 |
| 7 | | | | | | | | 3 | 6 | 1 | 4 | 6 | 9 | 9 | 1 | 6 | 2 | 6 | 2 | 9 |
| 8 | | | | | | | | | 6 | 6 | 3 | 4 | 5 | 5 | 3 | 6 | 2 | 4 | 1 | 7 |
| 9 | | | | | | | | | | 6 | 3 | 2 | 8 | 2 | 9 | 4 | 6 | 8 | 1 | 1 |
| 10 | | | | | | | | | | | 6 | 8 | 7 | 1 | 9 | 9 | 8 | 5 | 5 | 9 |
| 11 | | | | | | | | | | | | 1 | 6 | 5 | 7 | 1 | 1 | 4 | 3 | 9 |
| 12 | | | | | | | | | | | | | 2 | 4 | 3 | 5 | 2 | 7 | 3 | 8 |
| 13 | | | | | | | | | | | | | | 4 | 9 | 1 | 2 | 7 | 6 | 6 |
| 14 | | | | | | | | | | | | | | | 8 | 3 | 5 | 5 | 9 | 1 |
| 15 | | | | | | | | | | | | | | | | 9 | 6 | 1 | 9 | 3 |
| 16 | | | | | | | | | | | | | | | | | 3 | 1 | 7 | 8 |
| 17 | | | | | | | | | | | | | | | | | | 2 | 6 | 7 |
| 18 | | | | | | | | | | | | | | | | | | | 8 | 3 |
| 19 | | | | | | | | | | | | | | | | | | | | 3 |
| 20 | | | | | | | | | | | | | | | | | | | | |

When I ran my progam with this input, I got the following output:

```
Start at 1
Move to 2 at cost 5
Move to 3 at cost 5
Move to 4 at cost 2
Move to 8 at cost 1
Move to 9 at cost 6
Move to 11 at cost 3
Move to 12 at cost 1
Move to 13 at cost 2
Move to 16 at cost 1
Move to 17 at cost 3
Move to 19 at cost 6
Move to 20 at cost 3

Start at 1
Move to 5 at cost 8
Move to 6 at cost 6
Move to 7 at cost 1
Move to 10 at cost 1
Move to 14 at cost 1
Move to 15 at cost 8
Move to 18 at cost 1
Move to 20 at cost 3

Total cost: 67
```