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Assignment 4

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#### Assignment 4

1. Implement a greedy algorithm to approximately solve the TSP.
2. Dijkstra's algorithm is an example of a greedy algorithm. Give pseudocode for a modified version of Dijkstra's algorithm that returns `true` if the graph contains a cycle.

```
parent = empty map  $v \rightarrow v$ 
distance = empty map  $v \rightarrow \text{int}$ 
visited = empty set
cycleExists = false

while (not all vertices have been visited):
    current = cheapest unvisited vertex from distance table
    visited.add(current) & check if target
    for all other children in adjacent nodes of current:
        if child is in visited:
            cycleExists = true
        else:
            edgeCost = edge weight between current and other
            cost = distance(current)
            if (edgeCost + cost < distance(other)):
                update distance for other
                parent.push(other, current)

return cycleExists
```

3. Optimal File Storage

**These files should be stored from smallest to largest on the tape. That way, to get to the desired tape, you search through the smallest files first, meaning you can get to your destination faster.**

4. Weiss Exercise 10.3: A file contains only colons, spaces, newlines, commas, and digits in the following frequency: colon (100), space (605), newline (100), comma (705), 0 (431), 1 (242), 2 (176), 3 (59), 4 (185), 5 (250), 6 (174), 7 (199), 8 (205), 9 (217). Construct the Huffman Code.

<u>Character</u>	<u>Huffman Code</u>
:	001001
space	000

<b>newline</b>	<b>00101</b>
<b>,</b>	<b>11</b>
<b>0</b>	<b>101</b>
<b>1</b>	<b>1000</b>
<b>2</b>	<b>00111</b>
<b>3</b>	<b>001000</b>
<b>4</b>	<b>0100</b>
<b>5</b>	<b>1001</b>
<b>6</b>	<b>00110</b>
<b>7</b>	<b>0101</b>
<b>8</b>	<b>0110</b>
<b>9</b>	<b>0111</b>