ASSIGNMENT 2: TOPOLOGY RECOGNITION PROBLEM
PSEUDOCODE:

START MAIN()

5 ←- Initialize n, i, j , count, center
1 ←- Initialize W[][]
1 ←- Declare cond
1 ←- Read in a number, n 5 + 1 + 1 + 1 = 8

//DETERMINE IF RING
For i=0 to n
    For j=0 to n
        Read a list of array W[i][j]
End for

$$\sum_{i=0}^{n}\sum_{j=0}^{n} 1 = \left(\frac{n-0+1}{1}\right) = n + 1$$

For i=0 to n
    For j=0 to n
        If W[i][j] != 100 1 + max(1,0) = 2
            Count++
        If count != 3 1 + max(2,0) = 3
            Cond = false
            Break
    Count =0 (1)
    2 + 3 + 1 = 6
End for

$$\sum_{i=0}^{n}\sum_{j=0}^{n} 6 = \left(\frac{n-0+1}{1}\right)6 = (n+1)6 = 6n + 6$$

$$\sum_{i=0}^{n} 6n + \sum_{i=0}^{n} 6 = 6\left(\frac{n(n+1)}{2}\right) + (6n + 6)$$

$$= 3n^2 + 9n + 6$$

If cond = true 1 + max(2, 0) = 3
    Print “ring”
    Print elapsed time
Terminate

//DETERMINE IF STAR

```
1 ←- Count=0
1 ←- cond=true                                          1 + 1 = 2

For i=0 to n
        For j=0 to n
                If WW[i][j]!= 0 and W[i][j] != 100       3 + max(1,0) = 4
                        Count++
                If count = (n-1)                         2 + max(1,0) = 3
                        Center++
                If count > 1 && count != (n-1)           4 + max(2,0) = 6
                        Cond = false
                        Break

1 ←-    Count = 0                                       (1)
                                                        4 + 3 + 6 + 1 = 14
End for
```

$$\sum_{i=0}^{n}\sum_{j=0}^{n} 14 = (\tfrac{n-0+1}{1})14 = (n+1)14 = 14n + 14$$

$$\sum_{i=0}^{n} 14n + \sum_{i=0}^{n} 14 = 14(\tfrac{n(n+1)}{2}) + (14n + 14)$$

$$= 7n^2 + 21n + 14$$

```
If cond && center = 1                                   2 + max(2,0) = 4
        Print “star”
        Print elapsed time
Terminate
```

//DETERMINE IF FULLY CONNECTED MESH

```
1 ←- Cond = true                                        (1)

For i=0 to n
        For j=0 to n
                If W[i][j] = 100                         1 + max(2,5) = 6
```

Cond = false
Break
Else if W[i][j] = 0 && W[i][n-1-j] = W[n-1-i][j] 3+ max(0,2) = 5
Cond = false
Break
End for

$$\sum_{i=0}^{n}\sum_{j=0}^{n} 6 = (\tfrac{n-0+1}{1})6 = (n+1)6 = 6n+6$$

$$\sum_{i=0}^{n} 6n + \sum_{i=0}^{n} 6 = 6(\tfrac{n(n+1)}{2}) + (6n+6)$$

$$= 3n^2 + 9n + 6$$

If cond = true 1 + max(1,1) = 2
Print “fully connected mesh”
Else
Print “neither”

Print elapsed time (1)
Terminate

2 + 1 = 3

END MAIN

$$8 + (n+1) + (3n^2 + 9n + 6) + 3 + 2 + (7n^2 + 21n + 14) + 1 + (3n^2 + 9n + 6) + 3$$
$$= 13n^2 + 40n + 44$$

Prove:

$$13n^2 + 40n + 44 \; \varepsilon \; O(n^2)$$

$$\lim_{n\to\infty} 13n^2 + 40n + 44$$

$$\lim_{n\to\infty} \frac{13n^2}{n^2} = 13 \geq 0$$

```
CPSC 335-03 - Programming Assignment #2
Joshua Marvel, Tevisophea Heng
Topology recognition algorithm
Enter the number of nodes in the topology
5
Enter the positive weights, 100 for infinity
0 2 100 100 5
2 0 3 100 100
100 3 0 1 100
100 100 1 0 4
5 100 100 4 0
The topology is
ring
elapsed time: 0.001399 seconds
Press any key to continue . . .
```

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Topology recognition algorithm
Enter the number of nodes in the topology
5
Enter the positive weights, 100 for infinity
0 2 3 4 5
2 0 100 100 100
3 100 0 100 100
4 100 100 0 100
5 100 100 100 0
The topology is
star
elapsed time: 0.000991 seconds
Press any key to continue . . .
```

```
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Joshua Marvel, Tevisophea Heng
Topology recognition algorithm
Enter the number of nodes in the topology
5
Enter the positive weights, 100 for infinity
0 1 2 3 4
1 0 5 2 3
2 5 0 4 1
3 2 4 0 2
4 3 1 2 0
The topology is
fully connected mesh
elapsed time: 0.001598 seconds
Press any key to continue . . .
```

```
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Topology recognition algorithm
Enter the number of nodes in the topology
5
Enter the positive weights, 100 for infinity
0 2 100 4 5
2 0 3 100 100
100 3 0 1 100
4 100 1 0 4
5 100 100 4 0
The topology is
neither
elapsed time: 0.001194 seconds
Press any key to continue . . .
```