Computer Network HW1

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1 Problem 1

A: 4950 links.

Since the diameter of a network with 100 nodes is 1, this is a fully connected network. That is, there are $C_2^{100} = \frac{100 \times 99}{2} = 4950$ links.

2 Problem 2

A: 99 links.

The optimal solution is that we place 99 nodes as a circle and 1 node in the center. We give 99 links from the nodes on the circle to the center node, it makes that the diameter of the network with 100 nodes is 2.

3 Problem 3

A: 50.

The optimal solution is that we place the 100 nodes as a circle and each node links the right node and left node, which makes that the degree of each node is 2. Then, we know the fact that the diameter of the network is 50.

4 Problem 4

A: Impossible.

By the following picture, we use a greedy method to approach the goal. If the diameter of the network is 5 and the degree of every nodes is 3, there would be $1+3+6+12+24+48=94$ nodes on the network, which is less than 100. So it is impossible.