Q4: Convert the given maze into a graph. (Hint: For simplicity’s sake, use those specified grids (with the alphabet) to name the nodes, and their distance is the number of grids in between the paired named nodes as their distance. For example, node C and node R are reachable by forwarding 6 grids from C towards R, or from R towards C.)

**The following graph is a maze example: Assume A is the entrance. G and g are exits.**

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| **C** |  |  |  |  |  | **R** |  |  |  |  |  |  | **k** |  |  |  |  | **w** | **g1** |
|  |  |  |  |  |  | **Q** |  |  | **b** |  |  |  | **j** |  |  |  |  |  |  |
| **B** |  |  |  |  | **O** |  |  |  |  |  |  |  | **i** |  |  |  | **r1** |  | **z** |
|  |  |  |  | **L** | **N** |  |  |  |  | **c** |  | **e** |  |  |  | **o** | **r** | **v** |  |
|  |  | **E** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  | **a** |  |  |  | **h** |  |  |  |  |  |  |
|  |  | **D** | **H** | **K** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  | **P** |  | **Y** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | **J** | **M** |  | **T** |  |  |  |  |  |  |  |  |  | **q** | **u** | **y** |
|  |  |  | **G** | **I** |  |  |  |  | **Z** |  |  |  |  |  |  | **n** | **p** | **t** | **x** |
|  |  |  |  |  |  |  |  | **X** |  |  |  | **d** | **g** |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **S** | **V** |  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **m** |  |  |  |
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|  |  |  |  |  |  |  |  |  |  |  |  |  | **f** |  |  |  |  |  |  |
| **A** |  |  | **F** |  |  |  |  | **U** |  |  |  |  |  |  | **l** |  |  | **s** | g2 |

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**As 01 05022024**

Prove that the labels are a necessary and sufficient number of labels, such that there is a one-to-one corresponding between the maze and its associated undirected graph.

For example, it can have r as a cross junction to reach i, z, q, o. By introducing r1, then the graph would be 1-1 corresponding with the maze.