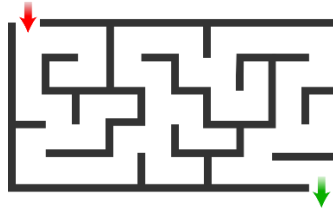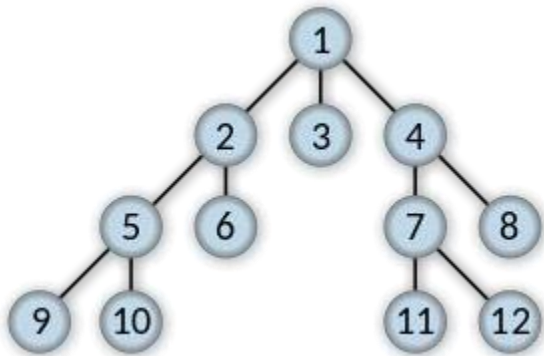# Algorithm (1)

1. You are expected to solve a 2-D maze using BFS. A maze is path typically, from start node 'S' to Goal node 'E'.

Input: 2D maze represented as a string.

Output: the full path from Start node to End node (Goal Node) and direct path to go from Start to End directly.

Example: let's say the end node is 6.

Full Path: 1, 2, 3, 4, 5, 6.

Path: 1, 2, 6.

The input and output are explained below. Your code should be generic for any dimension of a given maze.

Maze: 'S,.,.,#,.,.,. .,#,.,.,.,#,. .,#,.,.,.,.,. .,.,#,#,.,.,. #,.,#,E,.,#,.'

- Maze is a string, rows are separated by **space** and columns are separated by **comma ','**.
- The board is read **row wise**, the nodes are numbered **0-based** starting the leftmost node.
- You have to create your own board **as a 2D array** (NO 1D ARRAY ALLOWED) of **Nodes**.

```
S  .  .  #  .  .  .
.  #  .  .  .  #  .
.  #  .  .  .  .  .
.  .  #  #  .  .  .
#  .  #  E  .  #  .
```

Algorithm (2)

2. Implement Perceptron Neural Network for **AND** Logical Function.
   The Step function is the activation function using:
   - threshold = -0.2
   - learning rate = 0.1
   - number of iterations =100

   For the following data:

   Training set input= [[0, 0],
   [1, 1],
                           [1, 0],
                           [0, 1]]
   Output = [0,1, 0, 0]

Algorithm (3)

1. Implement ID3 algorithm on a dataset that holds a diagnosis for the eyes of patients.
   - The diagnosis is based on the following features:
     1. Age: (0) young, (1) adult.
     2. Prescription: (0) myope, (1) hypermetrope.
     3. Astigmatic: (0) no, (1) yes.
     4. Tear production rate: (0) normal, (1) reduced.
     5. Diabetic: (0) not diabetic patient, (1) is a diabetic patient.
   - The output classes are:
     1. Need contact lenses (1): the patient should be fitted with a special type of contact lenses.
     2. No contact lenses (0): the patient should not be fitted with a
     3. Special type of contact lenses.

   - Task:
     1. Classification using ID3 algorithm.
     2. Each feature has only two attributes 0 or 1.
     3. Output classes are only two values => 0 (no special contactlenses) and 1 (need special contact lenses).