

Functional Exercise

Test case design

There are many algorithms to generate a maze.

(http://en.wikipedia.org/wiki/Maze_generation_algorithm)

A valid maze has exactly one entry point and exactly one exit point (exactly 2 openings in the edges) and there must be at least one path from the entry point to exit point.

Write the test cases necessary to validate whether a maze is valid or not in the format that you find more appropriate. Make notes regarding coverage. Provide the solution and the notes you took to achieve it.

Maze validation test cases

Test scenario	Test steps	Test data	Expected results
Check that maze has exactly one entry point and one exit point	<ol style="list-style-type: none">1. Check number of openings in edges.2. Validate that one opening is the entry point3. Validate that opening is the exit point	A generated maze	<ol style="list-style-type: none">1. Number of openings is 2.2. Entry point exists3. Exit point exists
Check that entry point is not same as exit point	<ol style="list-style-type: none">1. Validate that the entry point is not the same point as the exit point	A generated maze	<ol style="list-style-type: none">1. The entry point is not the same as the exit point
Check that there is at least one path from the start to the finish	<ol style="list-style-type: none">1. Start at the entry point2. Move through the maze following your right-hand wall3. Stop when you reach the exit or the entrance**	A generated maze	<ol style="list-style-type: none">3. The exit is reached*
Check that both the entry point and the exit point are on the perimeter of the maze	<ol style="list-style-type: none">1. Validate that entry point is at the edge of the maze2. Validate that exit point is at the edge of the maze	A generated maze	<ol style="list-style-type: none">1. Entry point is at the edge of the maze2. Exit point is at the edge of the maze

**All two-dimensional mazes with the entry- and exit point on the perimeter can be solved by the "right-hand rule" if it is started immediately at the entry point (i.e. you make sure that you are not following a "wall island" inside the maze)*

***The entrance would only be reached if no exit exists on the perimeter. These conditions are validated in Scenarios 1,2 and 4.*

Test Coverage Matrix

Case Type	Test case	Validated in
Default case	One path one entry one exit entry and exit not same entry and exit on perimeter	All scenarios
Alternative path	Multiple paths	Scenario 3
Negative	No path	Scenario 3
Negative	No entry	Scenario 1
Negative	No exit	Scenario 1
Negative	>1 entry	Scenario 1
Negative	>1 exit	Scenario 1
Negative	Entry and exit same	Scenario 2
Boundary	Entry not on perimeter	Scenario 4
Boundary	Exit not on perimeter	Scenario 4

Any combination of negatives is also negative. All combinations of possible mazes are covered and validated in the 4 scenarios.

Only the values different from the default case's values are shown in the other cases for clarity and readability.