The Game Of Life

The Game of Life is set in a two-dimensional grid of square cells, each of which is in one of two possible states, alive or dead. Every cell interacts with its eight neighbours, which are the cells that are horizontally, vertically, or diagonally adjacent.

From an initial seed grid the game "evolves" one iteration at a time. An iteration applies scenarios to each cell to determine its next state. These scenarios are:

**Scenario 1**: Underpopulation

Given a game of life

When a live cell has fewer than two neighbours

Then this cell dies

**Scenario 2**: Overcrowding

Given a game of life

When a live cell has more than three neighbours

Then this cell dies

**Scenario 3**: Survival

Given a game of life

When a live cell has two or three neighbours

Then this cell stays alive

**Scenario 4**: Creation of Life

Given a game of life

When a dead cell has exactly three neighbours

Then this cell becomes alive

When applied these scenarios result in the following:

**Scenario 5**: Grid with no live cells

Given a game of life with the initial state consisting of all dead cells

When the game evolves one turn

Then the next state is also all dead cells

**Scenario 6**: Expected game outcome for seeded grid

Given a game of life with the initial state

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |
|  | \* | \* | \* |  |
|  |  |  |  |  |
|  |  |  |  |  |

When the game evolves one turn

Then the next state is

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  | \* |  |  |
|  |  | \* |  |  |
|  |  | \* |  |  |
|  |  |  |  |  |

When the game evolves another turn

Then the next state is

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |
|  | \* | \* | \* |  |
|  |  |  |  |  |
|  |  |  |  |  |

**Scenario 7**: Expected game outcome for another seeded grid

Given a game of life with the initial state

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  | \* |  |  |
|  |  |  | \* |  |
|  | \* | \* | \* |  |

When the game evolves one turn

Then the next state is

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | \* |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  | \* |  | \* |  |
|  |  | \* | \* |  |

When the game evolves another turn

Then the next state is

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | \* | \* |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | \* |  |
|  | \* |  | \* |  |

**Key**

|  |
| --- |
| \* |
|  |

= alive

= dead