

CS 152 Computer Programming Fundamentals

Project 6: Lights Out

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Spring 2025

This project is designed to let you practice manipulated 2D arrays in the context of an old electronic puzzle game.

The game of Lights Out¹ consists of a grid of lights. Initially, some of these lights are switched on. Pressing one of the lights will toggle it and the four adjacent lights². The goal is to turn off all the lights, preferably with as few button presses as possible.³

1 Program Description

I'm providing you with three files of code for this assignment

- `LightsOutGame.java` contains the methods to manage the Lights Out game. There are nine methods you must complete to be able to play the game. The `main` method in this class will set up the game board and start the GUI.

Please note: some of the TODO notes tell you to use a specific method when implementing your solution. *You will not receive full credit if you ignore this, even if the code otherwise works!*

- `LightsOutGUI.java` manages the GUI (Graphical User Interface) for the game. It will use the methods in `LightsOutGame.java` to set up a game and determine the results of pressing a light. You don't need to understand the code in this class, but feel free to take a look. The only method you need to use is `showGUI`, which is already being called in `LightsOutGame`'s `main` method in the code I gave you.
- `LightsOutTester.java` contains code to test the `LightsOutGame.java` methods. If you run this class, it will report how many tests you passed. You may find this especially useful when you have yet to complete enough methods to be able to play the game.

¹[https://en.wikipedia.org/wiki/Lights_Out_\(game\)](https://en.wikipedia.org/wiki/Lights_Out_(game))

²or fewer neighbors if the selected light is at the edge of the board, obviously

³Determining if an arbitrary pattern of lights is solvable (not all have a solution!) and finding a minimal solution is beyond the scope of this project.

Please note: most of these test cases involve multiple methods at once. Look at the specific test methods' code to see which methods need to be working for the tests to pass.⁴

1.1 Board Representation

The board is represented as a two-dimensional array of `booleans`, which each entry indicating the state of the light at that position (true for on, false for off). The GUI and testing code assume that the first row is at the top and the first column is on the left.⁵

2 Turning in your assignment

Submit your `LightsOutGame.java` file to the assignment in Canvas. Do not attach `.class` files or any other files.

⁴I've posted a quiz on Canvas to make sure you do this before getting too far into the project.

⁵This is what we usually do with 2D arrays anyway, but it's good to make sure we're all on the same page.