

PROBLEM 4: RANDOMWALKROBOT CLASS (10/10 points)

iRobot is testing out a new robot design. The proposed new robots differ in that they change direction randomly **after every time step**, rather than just when they run into walls. You have been asked to design a simulation to determine what effect, if any, this change has on room cleaning times.

Write a new class `RandomWalkRobot` **that inherits from** `Robot` **(like** `StandardRobot` **) but implements the new movement strategy.** `RandomWalkRobot` should have the same interface as `StandardRobot`.

Test out your new class. Perform a single trial with the `StandardRobot` implementation and watch the visualization to make sure it is doing the right thing. Once you are satisfied, you can call `runSimulation` again, passing `RandomWalkRobot` instead of `StandardRobot`.

Enter your code for classes `Robot` and `RandomWalkRobot` below.

```
1 # Enter your code for Robot and RandomWalkRobot in this box
2 class Robot(object):
3     """
4     Represents a robot cleaning a particular room.
5
6     At all times the robot has a particular position and direction in the room.
7     The robot also has a fixed speed.
8
9     Subclasses of Robot should provide movement strategies by implementing
10    updatePositionAndClean(), which simulates a single time-step.
11    """
12    def __init__(self, room, speed):
13        """
14        Initializes a Robot with the given speed in the specified room. The
15        robot initially has a random direction and a random position in the
16        room. The robot cleans the tile it is on
```

Correct

Test results

[Hide output](#)

CORRECT

Test: 1 setRobotPosition

```
robot = RandomWalkRobot(RectangularRoom(4, 9), 1.0)
robot.getRobotPosition()
loop 10 times:
    * Generate random x, y values
    * Check if Position(x,y) is in the room
      * If so, robot.setRobotPosition(Position(x, y))
      * robot.getRobotPosition()
```

Output:

```
Random position 0: (2.00, 3.00)
  In room; setting position. Position is now: (2.00, 3.00)
Random position 1: (4.00, 10.00)
Random position 2: (1.00, 9.00)
Random position 3: (4.00, 6.00)
Random position 4: (1.00, 5.00)
  In room; setting position. Position is now: (1.00, 5.00)
Random position 5: (4.00, 4.00)
Random position 6: (1.00, 6.00)
  In room; setting position. Position is now: (1.00, 6.00)
Random position 7: (4.00, 9.00)
Random position 8: (3.00, 6.00)
  In room; setting position. Position is now: (3.00, 6.00)
Random position 9: (3.00, 4.00)
  In room; setting position. Position is now: (3.00, 4.00)
```

Test: 2 test setRobotDirection

```
robot = RandomWalkRobot(RectangularRoom(5,8), 1.0)
robot.getRobotDirection()
loop 10 times:
  * Generate random direction value
  * robot.setRobotDirection(randDirection)
  * robot.getRobotDirection()
```

Output:

```
Random direction: 175
  Setting direction: 175
Random direction: 225
  Setting direction: 225
Random direction: 186
  Setting direction: 186
Random direction: 68
  Setting direction: 68
Random direction: 152
  Setting direction: 152
Random direction: 303
  Setting direction: 303
Random direction: 337
  Setting direction: 337
Random direction: 52
  Setting direction: 52
Random direction: 263
  Setting direction: 263
Random direction: 260
  Setting direction: 260
```

Test: 3 test updatePositionAndClean

```
Test RandomWalkRobot.updatePositionAndClean()
```

Output:

```
Creating room and robot...
Setting position and direction to Position(1.5, 2.5) and 90...
Calling updatePositionAndClean(); robot speed is 1.0
Passed; now calling updatePositionAndClean() 20 times
Passed test.
```

Test: 4 test updatePositionAndClean

```
Test RandomWalkRobot.updatePositionAndClean()
```

Output:

```
Creating randomly sized room: 9x10 - and robot at speed 0.92...
Robot initialized at random position
Was initial position cleaned? True
Robot initialized at random direction
Number of cleaned tiles: 1

Calling updatePositionAndClean() 30 times...
Cleaned the minimum number of tiles; test passed.
```

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