Assignment:2
Monte Carlo simulation

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Problems and corresponding .py files:

MIT ps6 - 3	>	runSimulation.py
MIT ps6 – 4	>	problem4MIT.py
MIT ps6 – 6	>	problem6MIT.py
Sir problems 2,3,4	>	reasonableTime.py

Problem # 3 MIT problem set 6

Goal: the goal of this was to build a method called runsimulation() which can run the simulations of robots cleaning a room.

Description: the function runsimulation() will take the following parameters: `num_robots, speed, width, height, min_coverage, num_trials,robot_type, visualize = False.`

Here num_robots will have the number of robots cleaning the room, speed will be the number of tiles the robot can travel through with each movement, width and height will have dimensions that define the size of the room, min_coverage will have the percentage of the room that needs to be cleaned, num_trials will be the number of trials , robot_type will be what type of robot

is cleaning: standardwalkrobot or randomwalkrobot and lastly boolean variable visualize to set if we want to see the simulation happening or not.

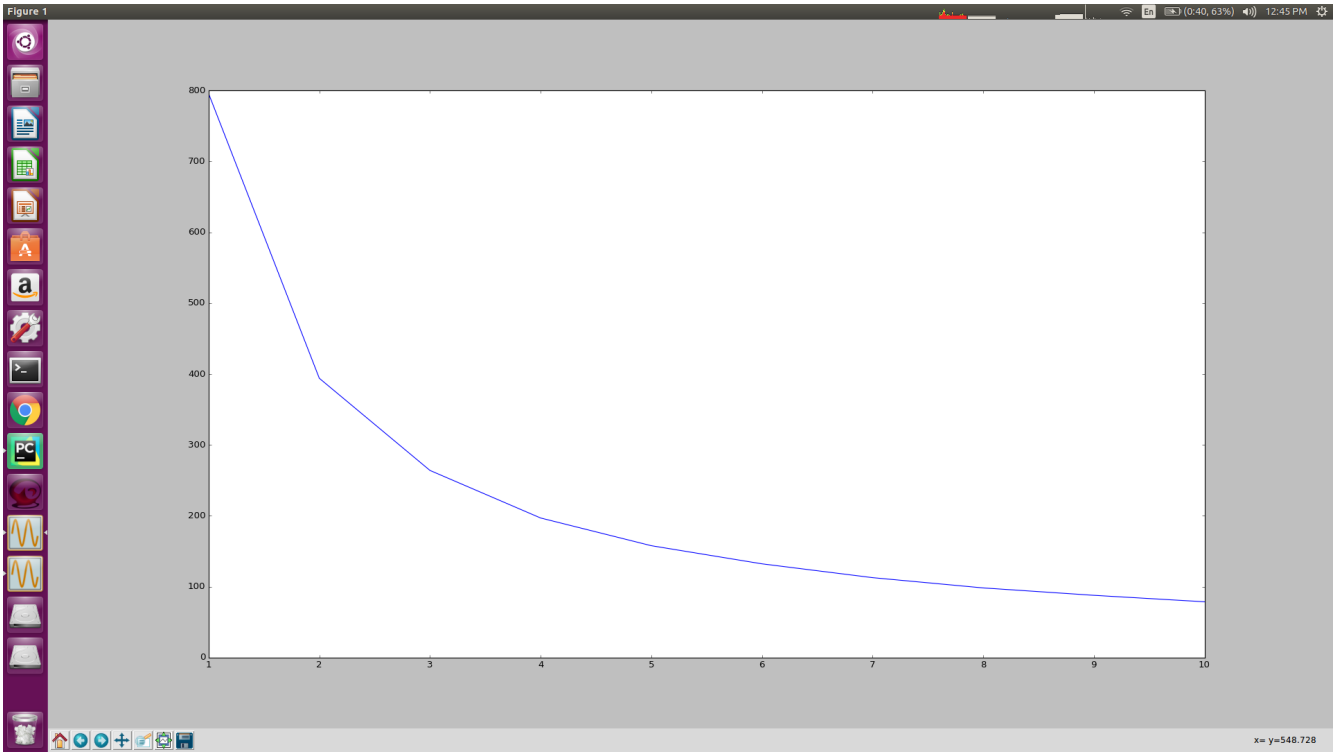
Idea: the idea to solve this problem is by using the given parameters and use it to run the simulation. Now in mainroom we initialize the room with its width and height. Then we initialize the robots by giving it the mainroom and the type of the robot. We get the number of robots from the num_robots field and run the trials by the number of num_trials. Then using a series of loops we run the simulation. This function is used in the next problems to find out the values asked in each question.

Problem # 4
MIT problem set 6

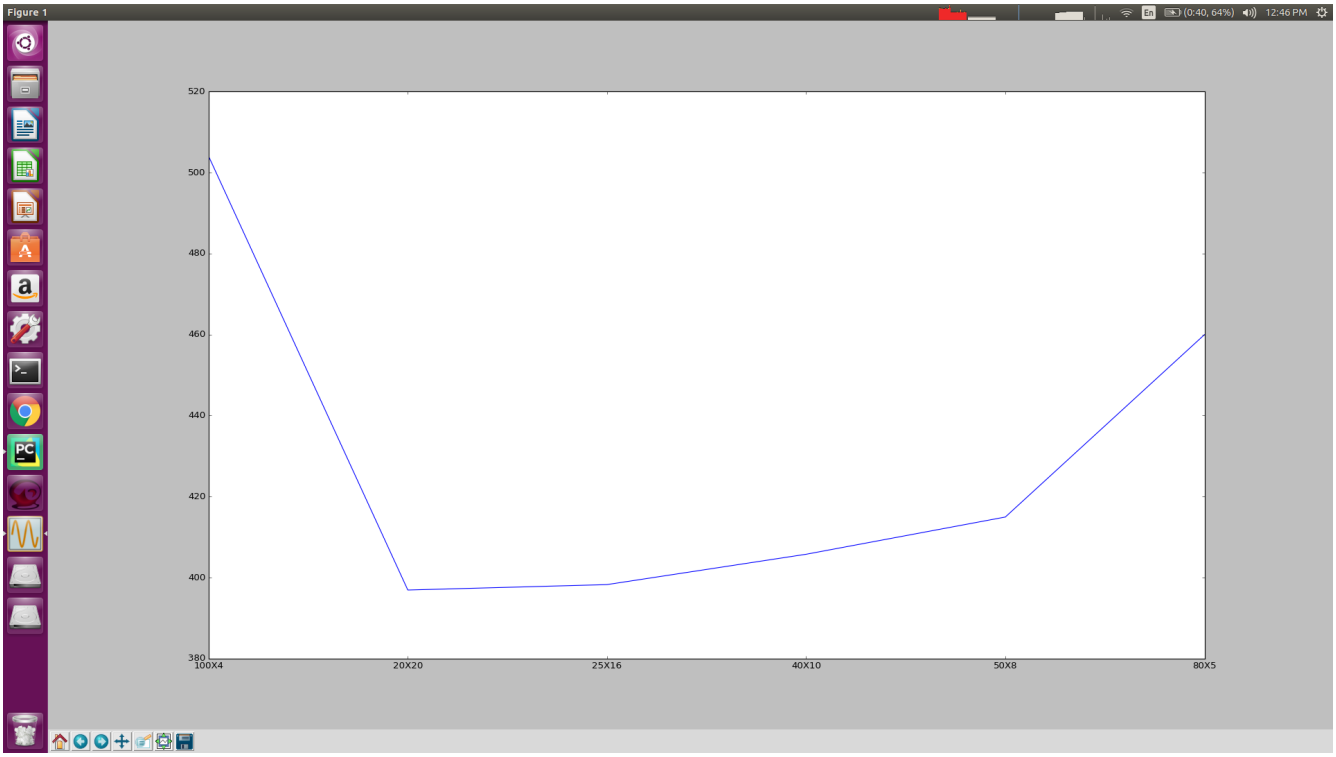
We simply simulate using runsimulation function with the given values of the questions.

The output graphs of both is given here:

StandardRobot from 1 robot to 10robots



Standard robot with different room dimensions:

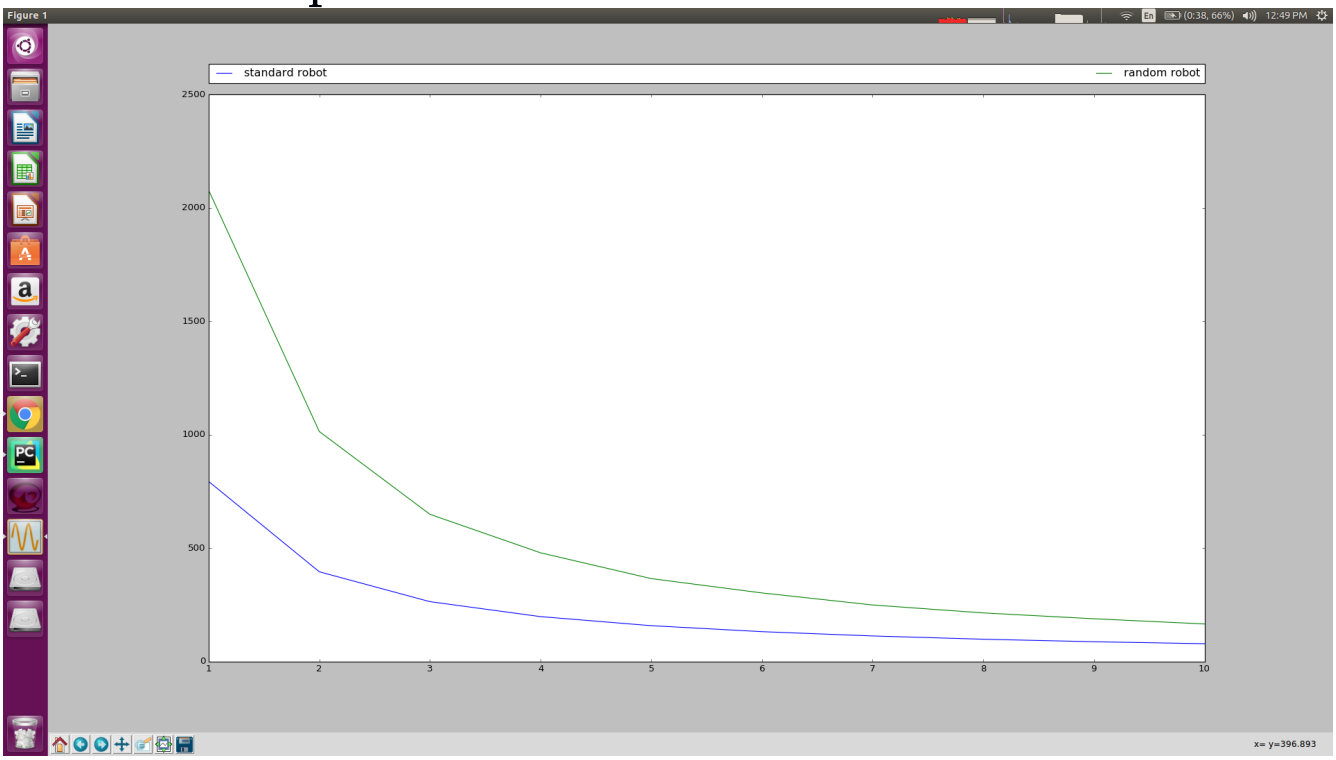


Problem # 6
MIT problem set 6

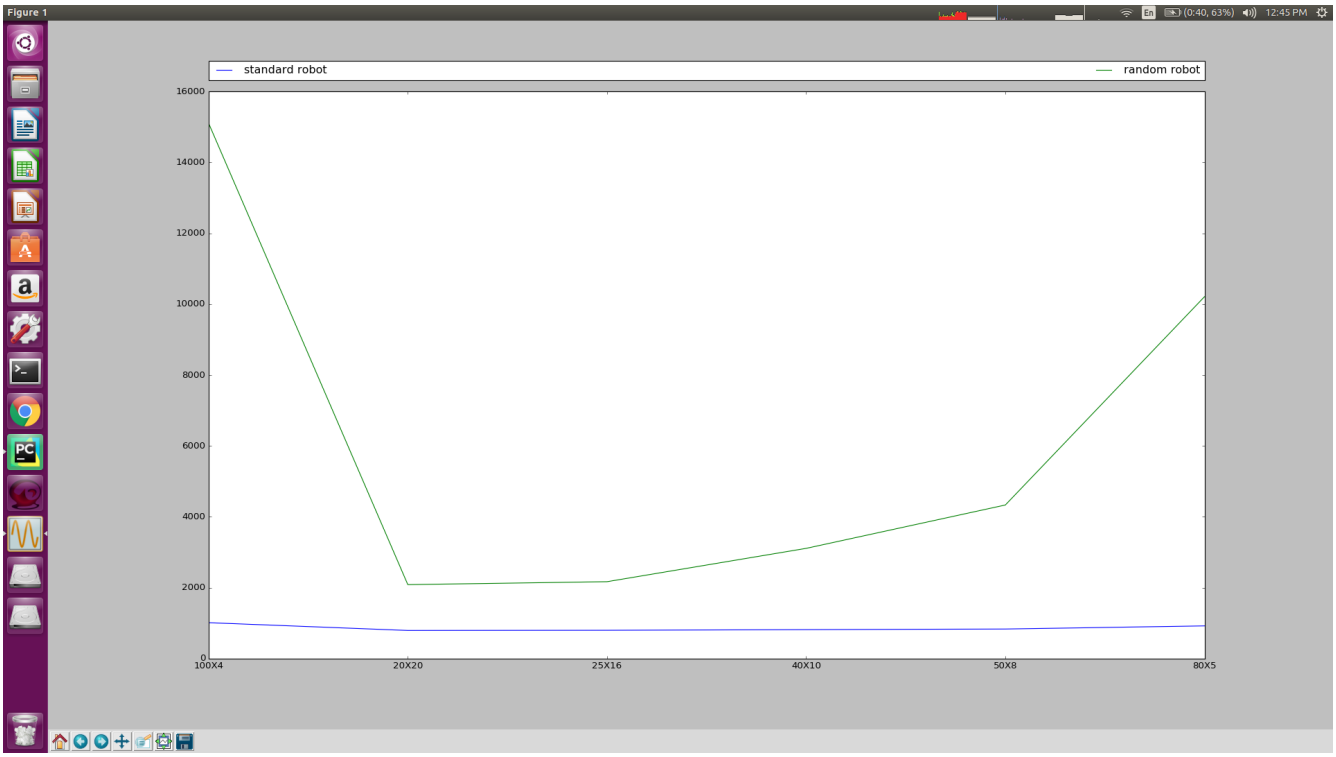
In this problem we compare the two types of robots by using just one robot and cleaning rooms of the same area but different dimensions. Also we compare the two robots with different number of robots.

The output graphs of both are given here:

Comparison based on number of robots:



Comparison based on different room dimensions:



Sir's problem 2,3,4 combined

Goal: To say with reasonable certainty how much time will be taken to clean a 10X10 room by 1 randomwalk robot and 1 standardwalk robot individually and compare the two.

Idea: the idea is to take the value when the graphs achieve linearity.

Description: I have made a method called `def reasonablePlusTen(robottype, tolerance)`

that takes the robottype and tolerance as parameters. In this method the number of trials start at 100 and increase by 10 and we get a value using runsimulation method. We check for 3 consecutive values that differ from each other by the specified tolerance value. If we find such values then it is understood that the values have reached linearity and it is safe to say that the value in the middle of these 3 values is the right number of steps taken by the robot to clean the room fully. The output graph is given below: (will be edited in the hard copy, its still running after some modifications)