import math, random, pylab

X = 0
Y = 1

def takeStep(position):
    direction = random.randint(0,3)
    if direction == 0: position[Y] += 1 #North
    elif direction == 1: position[X] +=1 #East
    elif direction == 2: position[Y] -= 1 #South
    else: position[X] -= 1 #West

def performTrial(numSteps):
    position = [0, 0]
    distances = []
    for secs in range(1, numSteps):
        takeStep(position)
        distance = math.sqrt(position[X]**2 + position[Y]**2)
        distances.append(distance)
    xAxis = pylab.arange(0, len(distances), 1)
    return distance

def performSim(numSteps, numTrials):
    distList = performSim(numSteps, numTrials)
    return distList

def analyzeStats(distList, numTrials):
    meanDist = pylab.sum(distList)/numTrials
    print 'Mean distance from origin:', meanDist

def simSteps(numSteps, numTrials):
    pylab.plot(xAxis, distances)
    distList = performSim(numSteps, numTrials)
    pylab.title('Distance from Origin')
    pylab.xlabel('Number of Steps')
    pylab.ylabel('Distance from Origin')
    return analyzieStats(distList, numTrials)

import pylab
pylab.plot([1,2,3,4])
pylab.plot([5,6,7,8])
pylab.figure()
pylab.plot([1,2,3,4], [1,2,3,4])
pylab.figure()
xAxis = [1,2,3,4]
yAxis = []
for x in xAxis: yAxis.append(x**2)
pylab.plot(xAxis, yAxis, 'ro')
pylab.figure()
y = pylab.arange(0, 1000, 100)
xAxis = pylab.array([0, 6, 0, 20])
pylab.xlabel('Earnings')
pylab.ylabel('Dollars')
pylab.plot(xAxis, y)
pylab.show()