

6.00 Handout, Lecture 11
(Not intended to make sense outside of lecture)

```
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)
    pylab.plot(xAxis, distances)
    pylab.title('Distance from Origin')
    pylab.xlabel('Number of Steps')
    pylab.ylabel('Distance from Origin')
    return distance

def performSim(numSteps, numTrials):
    distList = []
    distTot = 0.0
    for trials in range(numTrials):
        distance = performTrial(numSteps)
        distList.append(distance)
    return distList

def simSteps(numSteps, numTrials):
    distList = performSim(numSteps, numTrials)
    analyzeStats(distList, numTrials)

def analyzeStats(distList, numTrials):
    meanDist = pylab.sum(distList)/numTrials
    print 'Mean distance from origin:', meanDist
    pylab.figure()
    pylab.hist(distList)
    pylab.title('Distribution of Distances from Origin')
    pylab.xlabel('Distance from Origin')
    pylab.ylabel('Number of Trials')
```