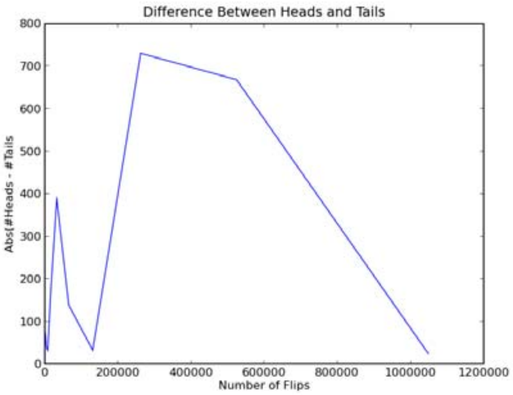
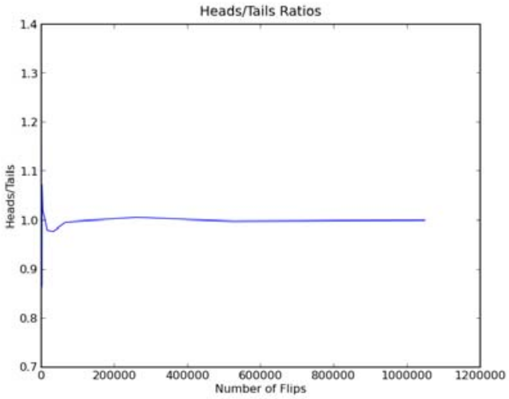
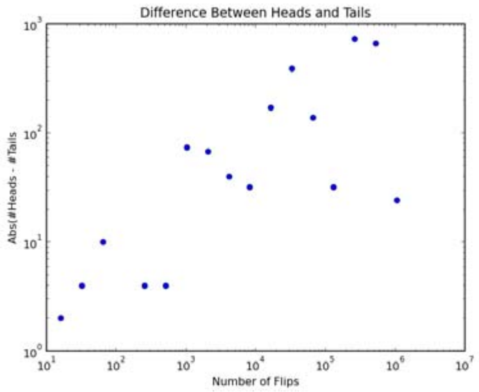
6.00 Handout, Lecture 14
(Not intended to make sense outside of lecture)

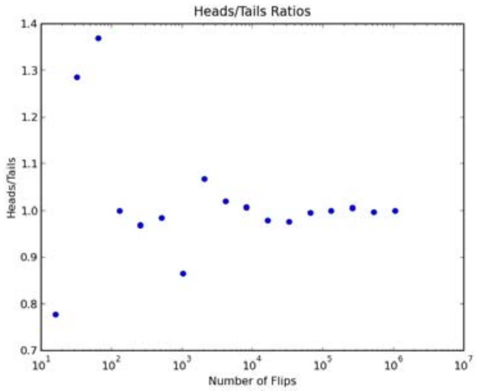
```
import random, pylab

principal = 10000.0 #initial investment

interestRate = 0.05

years = 20

values = []

for i in range(years + 1):

    values.append(principal)

    principal += principal*interestRate

pylab.plot(values)

##pylab.show()



##pylab.title('5% Growth, Compounded Annually')

##pylab.xlabel('Years of Compounding')

##pylab.ylabel('Value of Principal ($)')

##pylab.show()


def rollDie():
    """returns a random int between 1 and 6"""
    return random.choice([1,2,3,4,5,6])

def checkPascal(numTrials = 100000):
    yes = 0.0
    for i in range(numTrials):
        for j in range(24):
            d1 = rollDie()
            d2 = rollDie()
            if d1 == 6 and d2 == 6:
                yes += 1
                break
    print 'Probability of losing = ' + str(1.0 - yes/numTrials)

def flip(numFlips):
    heads = 0
    for i in range(numFlips):
        if random.random() < 0.5:
            heads += 1
    return heads/float(numFlips)

def flipSim(numFlipsPerTrial, numTrials):
    fracHeads = []
    for i in range(numTrials):
        fracHeads.append(flip(numFlipsPerTrial))
    mean = sum(fracHeads)/float(len(fracHeads))
    return (mean)

def stdDev(X):
    mean = sum(X)/float(len(X))
    tot = 0.0
    for x in X:
        tot += (x - mean)**2
    return math.sqrt(tot/len(X))
```





```
def flipPlot(minExp, maxExp):
    ratios = []
    diffs = []
    xAxis = []
    for exp in range(minExp, maxExp + 1):
        xAxis.append(2**exp)
    for numFlips in xAxis:
        numHeads = 0
        for n in range(numFlips):
            if random.random() < 0.5:
                numHeads += 1
        numTails = numFlips - numHeads
        ratios.append(numHeads/float(numTails))
        diffs.append(abs(numHeads - numTails))
    pylab.title('Difference Between Heads and Tails')
    pylab.xlabel('Number of Flips')
    pylab.ylabel('Abs(#Heads - #Tails')
    pylab.plot(xAxis, diffs)
    pylab.figure()
    pylab.plot(xAxis, ratios)
    pylab.title('Heads/Tails Ratios')
    pylab.xlabel('Number of Flips')
    pylab.ylabel('Heads/Tails')
    pylab.figure()
    pylab.title('Difference Between Heads and Tails')
    pylab.xlabel('Number of Flips')
    pylab.ylabel('Abs(#Heads - #Tails')
    pylab.plot(xAxis, diffs, 'bo')
    pylab.semilogx()
    pylab.semilogy()
    pylab.figure()
    pylab.plot(xAxis, ratios, 'bo')
    pylab.title('Heads/Tails Ratios')
    pylab.xlabel('Number of Flips')
    pylab.ylabel('Heads/Tails')
    pylab.semilogx()
```





MIT OpenCourseWare
http://ocw.mit.edu

6.00SC Introduction to Computer Science and Programming
Spring 2011

For information about citing these materials or our Terms of Use, visit: http://ocw.mit.edu/terms.