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# EE 381 Project 2
# Bernoulli Trials, Bayes' Rule, and General Probability

Bernoulli Trail:
print('\nBernoulli Trial Simulation.')

# Cast the number to float for success rate
p = float(input('Enter the Probability of Success:  '))

k = int(input('Enter the number of trails:  '))

# Using the old random number generator code from Project 1
# The norm N is 10,000
N = 10000
# The adder A is 4,857
A = 4857
# The multiplier is 8,601
M = 8601

# Input the Seed
#S = input("Enter seed number. ")
S = 1;

for i in range(k):
    S = (M*S + A)%N
    R = S/float(N) # Float division is used to obtain the number
on (0,1)
    print(format(R, '.4f')) # Print number to 4 decimal places
# End of Project 1 random number generator
    if R < p:
        print('Success!\n')
    else:
        print('Failure!\n')
```

Ball Can:

```
import math

# The norm N is 10,000
N = 100000
# The adder A is 4,857
A = 4857
# The multiplier is 8,601
M = 8601

Ball = [0, 0, 0]

# Initialize the counters
sum_One = 0
sum_Two = 0

# Initialize the Seed
#S = input("Enter seed number. ")
S = 0

# Initialize the number of Experiments
k = int(input('Enter the number of experiments. '))

for k in range(k):
    for i in range(3):
        S = (M*S + A)%N
        R = S/float(N) # Float division is used to obtain the
number on (0,1)

        # Generating number 1 - 5
        Ball_Number = math.floor(R*5 + 1)

        # Saving the randomized number into list
        Ball[i] = int(Ball_Number)
```

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        if (i == 2) & ((Ball[0] != Ball[1]) & (Ball[1] !=
Ball[2]) & (Ball[0] != Ball[2])):
            sum_One += 1
            #print('Distinct', Ball)
        elif i == 2:
            sum_Two += 1
            #print('Not Distinct', Ball)

print(sum_One / float((sum_One + sum_Two)))
```

Bayes Rule:

```
a = float(input("Enter the Probability of the pathology: "))
b = float(input("Enter the accuracy of the diagnostic: "))
c = float(input("Enter the probability of a false positive: "))

p = (a*b)/((a*b)+((1-a)*c))

print 'The probability of actually having the pathology is = ',p
```