

Joseph Spafford
A. Miller Math 331

03/23/2012

Homework for 03-23

03-23-51

#!/usr/bin/python

import random

n = 1000000

successes = 0

← could, but didn't, use random.seed here

j = n

while j > 0:

 j -= 1

 position = 0

 for x in range(9): # 10 steps

 if (random.randint(0,1) == 0):

 position += 1

 else:

 position += 1

 if (position == 0):

 successes += 1

 break

print "successes: " + str(successes)

print "probability of success " + str(successes/n)

$$\text{var}(Y) = \frac{1}{10,000,000} \cdot \frac{1}{4} \cdot \frac{1}{6^2} = .01$$

$$100 = 40,000,000 \epsilon^2$$

$$\epsilon^2 = \frac{1}{400,000}$$

$$\epsilon = \frac{1}{\sqrt{400,000}} \approx \frac{1}{632}$$

$$.01 \approx \frac{1}{40,000,000 \epsilon^2} > \frac{632^2}{90,000,000}$$

$$\frac{1}{632} \approx .002$$

$$Y_1 = .7266686 \approx .727$$

$$P(p < .725 \text{ or } p > .729) \leq .01$$

∴ with a reliability of 99% the actual probability

is $\pm .002$ of .727

over ↘

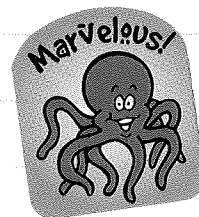
51 A

52 A

53 A

54 A

55 A



$$52.1) \quad u^2 \leq v$$

If $u=0$

put $P(X=0) = \frac{1}{2}$

$P(X=1) = \frac{1}{2}$

Let X be a random variable such that

$$P(X=\frac{v}{u}) = \frac{u^2}{v} \quad \text{and} \quad P(X=0) = 1 - \frac{u^2}{v}$$

then $E(X) = \frac{u^2}{v} \cdot \frac{v}{u} = u$ and $E(X^2) = \frac{v^2}{u^2} \cdot \frac{u^2}{v} = v$

$$03-23-(53) \quad P(X \geq 78) \leq \frac{\mu}{78} = \frac{68}{78} \approx 0.87$$

$$03-23-(54) \quad P(X \geq 78) \leq P(|X-68| \geq 10) \leq \frac{36}{100} = 0.36$$

03-23-(55)

Let $Z = Z_1 + Z_2 + \dots + Z_n$ the total score of the class.

$$P(|Z - 68n| \geq 5n) \leq \frac{\pi \cdot 36}{25 n^2} \leq 0.05$$

$$\frac{36}{25n} \leq 0.05$$

$$n \geq 28.79$$

$$n = 29 \text{ students}$$