

Summarized Results for 100,057 Second Run

February 13, 2005

General

All: 100,055 Graphs

Relatively Prime: 30,239 Graphs

Primitive Root: 30,240 Graphs

Relatively Prime and Primitive Root: 9,192 Graphs

Neither: 48,768 Graphs

Not Primitive Root: 69815 Graphs

Largest Cycle: 100,052 ($g = 58, 303$)

Longest Tail: 1,589 ($g = 18, 115$)

Shortest Maximum Cycle: 1 (24 values of g)

Number of Components

Observed All:

$$760,744/100,055 \approx 7.603$$

Observed RP:

$$229,961/30,239 \approx 7.605$$

Maps

Theoretical:

$$\frac{1}{2} \log n = \frac{1}{2} \log 100,057 \approx 5.76$$

Observed None:

$$276,831/48,768 \approx 5.68$$

Observed Not PR:

$$396,228/69,815 \approx 5.68$$

Permutations

Theoretical:

$$\sum_{i=1}^{100,057} \frac{1}{i} \approx 12.09$$

Observed PR:

$$364,516/30,240 \approx 12.05$$

Observed RPPR:

$$110,564/9,192 \approx 12.03$$

Number of Cyclic Nodes

Observed All:

$$3,041,638,223/100,055 \approx 30,399.66$$

Observed RP:

$$924,524,805/30,239 \approx 30,573.92$$

Maps

Theoretical:

$$\sqrt{\pi n/2} = \sqrt{\pi 100,057/2} \approx 396.457$$

Observed None:

$$11,134,730/48,768 \approx 228.32$$

Observed Not PR:

$$15,944,783/69,815 \approx 228.39$$

Permutations

Theoretical:

$$100,056$$

Observed PR:

$$3,025,693,440/30,240 = 100,056$$

Observed RPPR:

$$919,714,752/9,192 = 100,056$$

Number of Tail Nodes

Observed All:

$$6,969,564,912/100,055 \approx 69,657.33$$

Observed RP:

$$2,101,098,818/30,239 \approx 69,483.08$$

Maps

Theoretical:

$$n - \sqrt{\pi n/2} = 100,057 - \sqrt{\pi 100,057/2} \approx 99,660.55$$

Observed None:

$$4,868,445,046/48,768 \approx 99,828.68$$

Observed Not PR:

$$6,969,534,672/69,815 \approx 99,828.61$$

Permutations

Theoretical:

$$1$$

Observed PR:

$$30,240/30,240 = 1$$

Observed RPPR:

$$9,192/9,192 = 1$$

Number of Terminal Nodes

Observed All:

$$5,224,643,043/100,055 \approx 52,217.71$$

Observed RP:

$$1,572,707,711/30,239 \approx 52,009.25$$

Maps

Theoretical:

$$e^{-1}n = e^{-1} * 100,057 \approx 36,808.9$$

Observed None:

$$3,651,914,284/48,768 \approx 74,883.41$$

Observed Not PR:

$$5,224,612,803/69,815 \approx 74,835.10$$

Permutations

Theoretical:

$$1$$

Observed PR:

$$30,240/30,240 = 1$$

Observed RPPR:

$$9,192/9,192 = 1$$

Number of Image Nodes

Observed All:

$$100,057 - 52,217.71 \approx 47,839.29$$

Observed RP:

$$100,057 - 52,009.25 \approx 48,047.75$$

Maps

Theoretical:

$$(1 - e^{-1})n = (1 - e^{-1}) * 100,057 \approx 63,248.09$$

Observed None:

$$100,057 - 74,883.41 \approx 25,173.59$$

Observed Not PR:

$$100,057 - 74,835.10 \approx 25,221.90$$

Permutations

Theoretical:

$$n - 1 = 100,057 - 1 = 100,056$$

Observed PR:

$$100,057 - 1 = 100,056$$

Observed RPPR:

$$100,057 - 1 = 100,056$$

Average Tail Length

Observed All: 114.216

Observed RP: 114.86

Maps

Theoretical: $\sqrt{\pi n/8} = \sqrt{\pi 100,057/8} \approx 198$

Observed None: 113.94

Observed Not PR: 114.22

Permutations

Theoretical: 1

Observed PR: 1

Observed RPPR: 1

Average Cycle Length

Observed All: 115.32

Observed RP: 115.41

Maps

Theoretical:

$$\sqrt{\pi n/8} = \sqrt{\pi 100,057/8} \approx 198$$

Observed None:

114.64

Observed Not PR:

114.67

Permutations

Theoretical:

$$\frac{n+1}{2} = \frac{100,057+1}{2} = 50,029$$

Observed PR:

50,191.4

Observed RPPR:

50,454.6

Maximum Cycle Length

Observed: Observed All:

19,028.01

Observed RP:

19,218.92

Maps

Theoretical:

$$c_1\sqrt{n} \approx 0.78248\sqrt{100,057} \approx 247.5$$

Observed None:

142.96

Observed Not PR:

143.02

Permutations

Theoretical:

$$0.62432965n = 0.62432965 * 100057 \approx 62,468.55$$

Observed PR:

62,627.74

Observed RPPR:

62,896.84

Maximum Tail Length

Observed All:

218.15

Observed RP:

218.69

Maps

Theoretical:

$$c_2\sqrt{n} \approx 1.73746\sqrt{100,057} \approx 549.59$$

Observed None:

311.53

Observed Not PR:

312.20

Permutations

Theoretical:

1

Observed PR:

1

Observed RPPR:

1

7