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Random numbers generation using Mixed Congurential Method
Enter Seed: 23
Enter constant multiplier: 2
Enter incrementer(c != 0): 5
Enter modulus(+ve): 57
Enter sequence length: 11
51 50 48 44 36 20 45 38 24 53 54
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Multiplicative Congurential Method
First 50 random numbers:
195 925 875 125 875 125 875 125 875 125 875 125 875 125
 875 125 875 125 875 125 875 125 875 125 875 125 875 12
5 875 125 875 125 875 125 875 125 875 125 875 125 875 1
25 875 125 875 125 875 125 875 125
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Kolmogorov - Smirnov test
How many numbers?: 10
Enter 10 numbers: 0.44 .19 .88 .27 .55 .13 .63 .74 .24 .33
The numbers in ascending order is:
0.13 0.19 0.24 0.27 0.33 0.44 0.55 0.63 0.74 0.88

        i       1       2       3       4       5       6       7       8       9       10
     R(i)    0.13    0.19    0.24    0.27    0.33    0.44    0.55    0.63    0.74    0.88
      i/n     0.1     0.2     0.3     0.4     0.5     0.6     0.7     0.8     0.9       1
       D+   -0.03    0.01    0.06    0.13    0.17    0.16    0.15    0.17    0.16    0.12
       D-    0.13    0.09    0.04   -0.03   -0.07   -0.06   -0.05   -0.07   -0.06   -0.02
D+ max: 0.17
D- max: 0.13
D =max(0.17, 0.13) =0.17
Enter the tabulated value: .410
The test is accepted.
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-------- Chi Square test-------
Enter the number of classes or values:10
Enter the Tabulated value of chi:16.9
Enter frequencies of the interval: 8 8 10 9 12 8 10 14 10 11

Calculated differences:         0.4     0.4     0       0.1     0.4     0.4
    0       1.6     0       0.1
Obtained chi square value:3.4
Rejected:The given distributions are not uniform.

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Enter the population mean: 29
Enter the number of samples: 10
Enter the sample data:
3 43 20 14 11 35 29 23 19 20

Sample Mean (Point Estimate): 21.7000
Bias = Sample Mean - Population Mean: -7.3000

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----- Auto-correlation test -----
Enter number of random numbers to generate: 23
Enter lag value: 3
Generated Random Numbers:
0.8367 0.2608 0.8668 0.8672 0.5531 0.5076 0.8858 0.6897
 0.9718 0.0157 0.7969 0.4645 0.6798 0.1248 0.7808 0.550
1 0.3989 0.7768 0.1878 0.8669 0.9537 0.2389 0.4942

Autocorrelation Coefficient (lag 3): 0.00078
=> Likely independent (good randomness)
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Enter Arrival Rate : 5
Enter Service Rate : 7.5

M/M/1 Queue Performance Measures:
Traffic Intensity (≟ü): 0.667
Average number in system (L): 2.000
Average number in queue (Lq): 1.333
Average time in system (W): 0.400
Average time in queue (Wq): 0.267

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--- Area Under Curve (Monte Carlo) ----
Enter number of random points to generate: 4308745

Points below curve: 1436531
Estimated area under the curve y = x^2 from 0 to 1 is: 0.333399

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Enter the number of samples: 10
Enter the sample data:
43 23 44 20 34 34 55 32 29 30
Enter population mean (if known, else enter 0): 0
Enter confidence level (e.g. 0.95 for 95%): .95

Sample Mean: 34.4000
Sample Standard Deviation: 10.4478
95.0000% Confidence Interval: [27.9244, 40.8756]

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          START TIME          END TIME  BLOCKS  FACILITIES  STORAGES
               0.000         10008.107     9         1          0


          NAME                         VALUE
          INSPECTOR                  10000.000
          REJECTED                       9.000


 LABEL              LOC  BLOCK TYPE     ENTRY COUNT CURRENT COUNT RETRY
                    1    GENERATE          1000             0       0
                    2    QUEUE             1000             0       0
                    3    SEIZE             1000             0       0
                    4    DEPART            1000             0       0
                    5    ADVANCE           1000             0       0
                    6    RELEASE           1000             0       0
                    7    TRANSFER          1000             0       0
                    8    TERMINATE          906             0       0
REJECTED            9    TERMINATE           94             0       0


FACILITY         ENTRIES  UTIL.   AVE. TIME AVAIL. OWNER PEND INTER RETRY DELAY
 INSPECTOR          1000    0.691       6.915  1        0    0     0     0      0


QUEUE              MAX CONT. ENTRY ENTRY(0) AVE.CONT. AVE.TIME   AVE.(-0) RETRY
 INSPECTOR           1    0   1000    1000      0.000      0.000      0.000   0


FEC XN   PRI         BDT      ASSEM  CURRENT  NEXT  PARAMETER    VALUE
  1001    0       10010.000   1001      0      1
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```
          START TIME          END TIME  BLOCKS  FACILITIES  STORAGES
               0.000            25.893     9         1          0


          NAME                         VALUE
          BARBER                     10000.000


 LABEL              LOC  BLOCK TYPE     ENTRY COUNT CURRENT COUNT RETRY
                    1    GENERATE             2             0       0
                    2    QUEUE                2             0       0
                    3    SEIZE                2             1       0
                    4    DEPART               1             0       0
                    5    ADVANCE              1             0       0
                    6    RELEASE              1             0       0
                    7    TERMINATE            1             0       0
                    8    GENERATE             0             0       0
                    9    TERMINATE            0             0       0


FACILITY         ENTRIES  UTIL.   AVE. TIME AVAIL. OWNER PEND INTER RETRY DELAY
 BARBER             2     0.561       7.262  1        3    0     0     0      0


QUEUE              MAX CONT. ENTRY ENTRY(0) AVE.CONT. AVE.TIME   AVE.(-0) RETRY
 BARBER              1    1      2       1     0.132      1.707      3.413   0


CEC XN   PRI         M1       ASSEM  CURRENT  NEXT  PARAMETER    VALUE
     3    0        22.480       3      3      4


FEC XN   PRI         BDT      ASSEM  CURRENT  NEXT  PARAMETER    VALUE
     4    0        31.522       4      0      1
     2    0        60.000       2      0      8
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```
---------- Poker Test (Independence Test) ----------
Enter total number of random digits to generate (e.g., 20000): 4500
Enter size of each group (e.g., 4): 4

Observed Frequencies:
All different       : 556
Four of a kind      : 1
One pair            : 509
Three of a kind     : 36
Two pairs           : 23

Chi-Square Components:
All different       O=556, E=567.00, contrib=0.21
Four of a kind      O=1, E=1.12, contrib=0.01
One pair            O=509, E=486.00, contrib=1.09
Three of a kind     O=36, E=40.50, contrib=0.50
Two pairs           O=23, E=30.38, contrib=1.79

Chi-Square Statistic: 3.6064
Degrees of freedom: 4
Compare with chi-square critical value for df = 4 at 0.05 significance level: ~9.488
Sequence passes the Poker test (likely independent/random).
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----- Markov Chain(Weather Prediction) ----
Enter number of days to simulate: 6
Day 0: Sunny
Day 1: Cloudy
Day 2: Cloudy
Day 3: Sunny
Day 4: Sunny
Day 5: Cloudy
Day 6: Rainy

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------- Monte Carlo Simulation -------
Enter number of points to generate: 531205

No of points inside circle: 417133
Estimated value of PI = 3.14103

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