Simulating Car Sales.
Excel Spreadsheet

Car Sales Simulation

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| **4** | | Sales | P(X=x) | P(X<x) | X | | |
| **5** | | 0 | 0.1 | 0 | 0 | | |
| **6** | | 1 | 0.2 | 0.1 | 1 | | |
| **7** | | 2 | 0.4 | 0.3 | 2 | | |
| **8** | | 3 | 0.2 | 0.7 | 3 | | |
| **9** | | 4 | 0.1 | 0.9 | 4 | | |
| **10** | | | | | | | |
| **11** | | | | | | | |
| **12** | Date | Rand() | X | Average | Variance | If X=1 | Est P(X=1) |
| **13** | 01-Jan | 0.933776 | 4 | 4 | #DIV/0! | 0 | 0 |
| | 02-Jan | 0.825442 | 3 | 3.5 | 0.5 | 0 | 0 |
| | 03-Jan | 0.880881 | 3 | 3.333333 | 0.333333 | 0 | 0 |
| | 04-Jan | 0.342366 | 2 | 3 | 0.666667 | 0 | 0 |
| | 05-Jan | 0.588556 | 2 | 2.8 | 0.7 | 0 | 0 |

Formulae

A13 = date
B13 = RAND()
C13==VLOOKUP(B19,$D$5:$E$9,2) just handy for random values
D13=AVERAGE($C$13:C13)  cumulative average of sales 1..n
E13= STDEV($C$13:C13)^2
F13=IF(D13=1,1,0)
G13=AVERAGE($F$13:F13)  estimate of P(X=1) based on 1..n

Copy row 13 for 364 rows to get a full year.

VLOOKUP(x,table,k) scans column 1 of the table for row with largest $value \le x$ , it returns the value from the kth column in that row of the table.

So if RAND() <0.1 , the value from row 5 (row 1 in table) and Column E (column 2 of table) is Returned

P(RAND()<0.1)=0.1  so P(X=0)=0.1

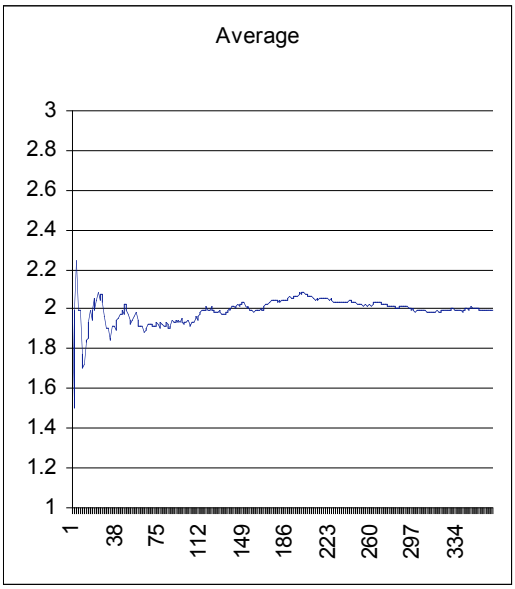
If $0.1 \le RAND() < 0.3$ then value in E6 is returned X=1

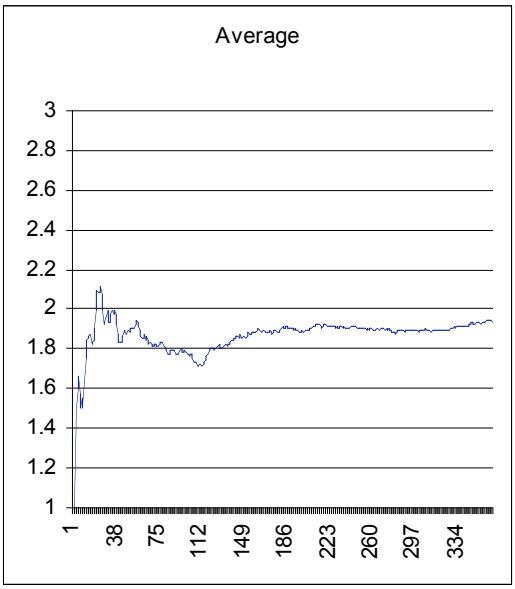
$P(0.1 \le RAND() < 0.3) = 0.3 - 0.1 = 0.2$  as required

and so on.

Charts

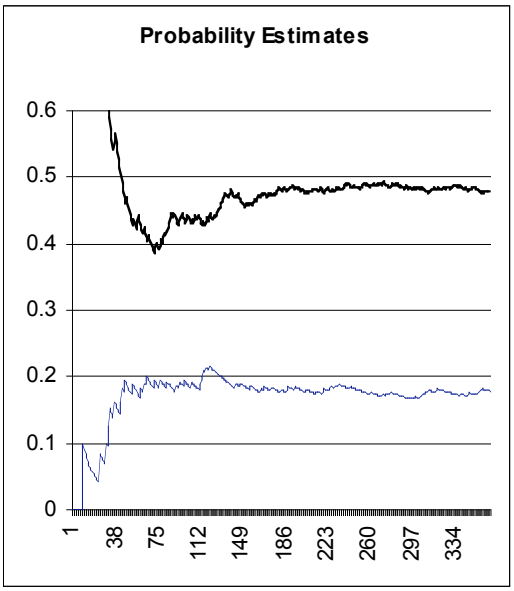
Cumulative averages over the year. E(X)=2

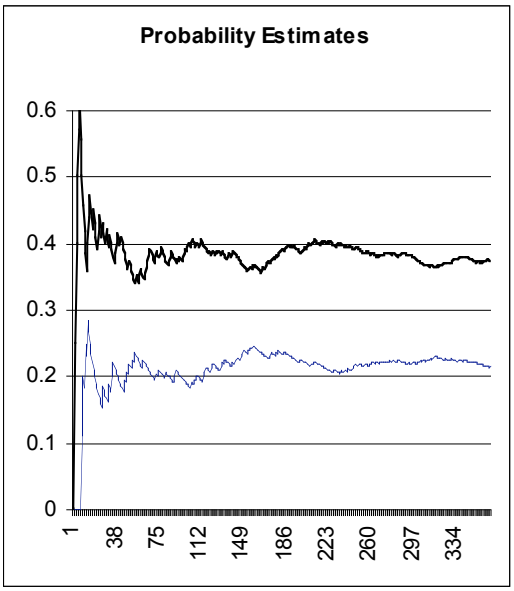



Plotted value $\bar{X} = \frac{1}{n}\sum_{i=1}^{n} x_n$ n=1,2..365

Estimates of P(X=1)=0.2 P(X=2)=0.4




Estimates of mean settle down more quickly. From a small sample we might get a reasonable idea of what the mean is. We need larger samples to estimate probabilities.