Lottery Problem

Assume that the state of California offers a lottery in which you can select 5 different numbers in any order ranging from numbers 1 to 50. In this process there are 5 winning numbers, and 45 losing numbers.

Let x be the number of winning numbers that you can have in any selection. Since we can count the number of winning numbers on any selection, then x is a discrete random variable and can assume $0, 1, 2, 3, 4,$ or 5 as values.

When $x = 0$, this means that we have 0 of the 5 winning numbers and 5 of the 45 losing numbers.

When $x = 2$, we conclude that we have 2 of the 5 winning numbers, and 3 of the 45 losing numbers.

When $x = 4$, we conclude that we have 4 of the 5 winning numbers, and 1 of the 45 losing numbers.

Constructing Probability distribution table:

1. Since there are 50 numbers and we are selecting 5 of them in any order, then the total number of ways that we can do this selection is ${}_{50}C_5$.
2. When $x = 0$, then we have 0 of the 5 winning numbers, and the total number of ways that we can do that is given by ${}_5C_0$.
3. When $x = 0$, then we have 5 of the 45 losing numbers, and the total number of ways that we can do that is given by ${}_{45}C_5$.
4. Now to find the probability when $x = 0$:

$$P(x = 0) = \frac{{}_5C_0 \bullet {}_{45}C_5}{{}_{50}C_5}$$

We can use the same type of approach to find the probabilities when $x = 1, x = 2, x = 3, x = 4,$ and $x = 5$.

Now here is our probability distribution table:

x	$P(x)$ (Exact)	$P(x)$ (Four Decimals)
0	$\frac{{}_5C_0 \bullet {}_{45}C_5}{{}_{50}C_5}$	0.5766
1	$\frac{{}_5C_1 \bullet {}_{45}C_4}{{}_{50}C_5}$	0.3516
2	$\frac{{}_5C_2 \bullet {}_{45}C_3}{{}_{50}C_5}$	0.0670
3	$\frac{{}_5C_3 \bullet {}_{45}C_2}{{}_{50}C_5}$	0.0047
4	$\frac{{}_5C_4 \bullet {}_{45}C_1}{{}_{50}C_5}$	0.0001
5	$\frac{{}_5C_5 \bullet {}_{45}C_0}{{}_{50}C_5}$	0.0000

If you enter the first two columns into **L1** and **L2**, you can calculate μ, σ, and σ^2.

After entering the first two columns into **L1** and **L2**, then apply the following sequence of keys on your calculator:

STAT **CALC** **1-VAR STATS** **L1 , L2** **ENTER**

Please note that s_x is blank and $n = 1$, otherwise something must be wrong.