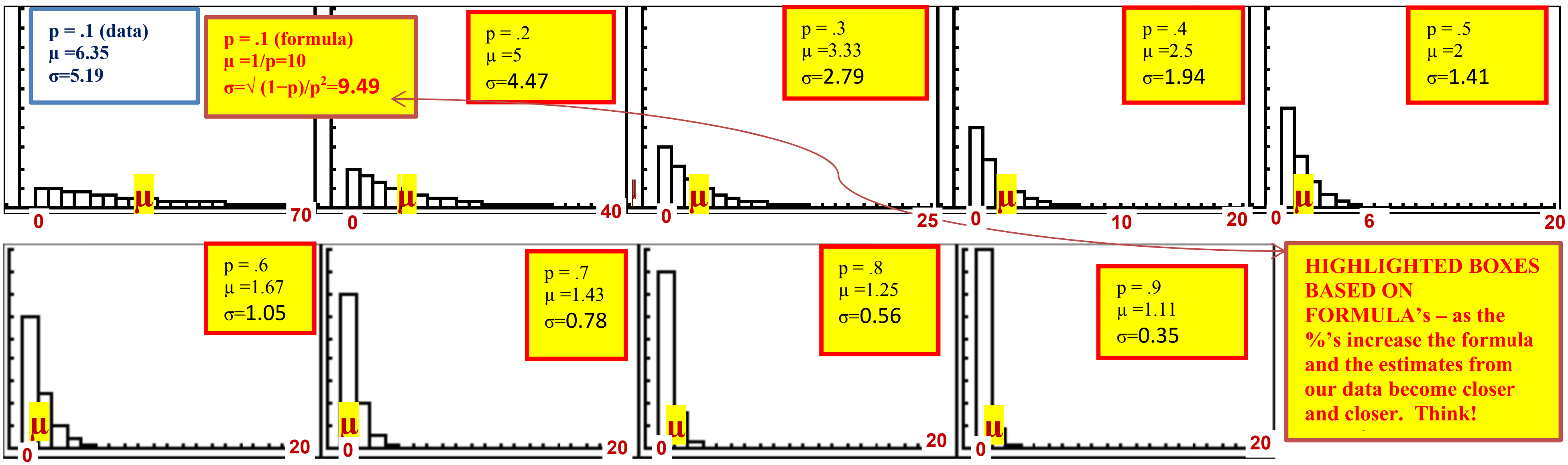
6.3 Geometric Activity

Let's examine the geometric distributions for varying probabilities of defective light bulbs. Find when the first defective light bulb occurs as we sample light bulbs from a large population.

1. Create the geometric distribution for the probability of 10% defective bulbs by entering the following into your calculator.
   L1: X 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 (X continues to infinity, but this will give us an idea of these distributions)
   L2: P(X) **geometpdf(.1,L1)** (be sure to go on top of L2)
2. Create a histogram of this distribution and sketch below
   Use: Xlist: L1 & Freq: L2 **Window: xmin: 0, xmax: 21, xscl: 1, ymin: 0, ymax: 1, yscl: 0.1**
3. Calculate the mean and standard deviations for probability distribution. **1-Var Stats> List:[L1] FreqList:[L2] > μ=Σx=___ σx=___**
4. Repeat steps 1-3 for the remaining probabilities then answer the questions below.



5. What do you notice about the geometric distributions as the probability of success (defective) increases (shape, center, and spread)?
   - **As the probability for the first defective light bulb increases (from 10% to 90% defective), the mean decreases (from 10 to close to 1), the spread becomes very narrow, and the shape becomes less skewed right and more peaked at the mean.**
6. What are the parameter(s) for geometric models? What are the formulas for the mean and standard deviations for geometric distributions?

Geometric Distribution is G(p): $E(X)=\mu= 1/p$ $VAR(X)=\sigma^2= q/p^2$ $q=(1-p)$