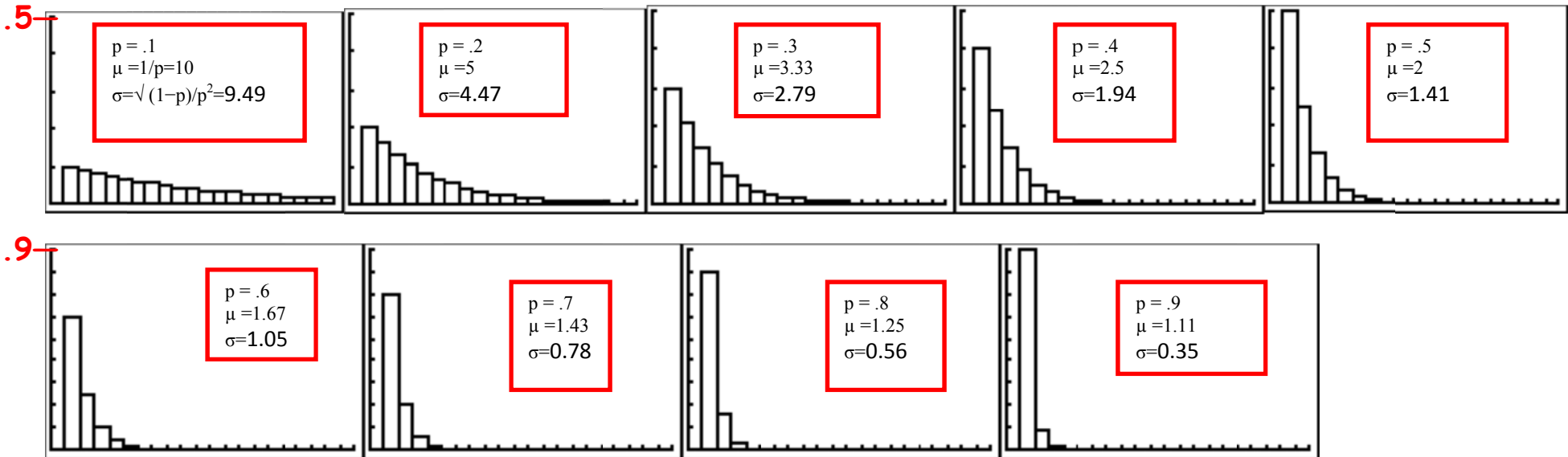# 6.3 Geometric Activity

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. Use the formula's below

4. Repeat steps 1-3 for the remaining probabilities then answer the questions below.

p = .1
$\mu = 1/p = 10$
$\sigma = \sqrt{(1-p)/p^2} = 9.49$

p = .2
$\mu = 5$
$\sigma = 4.47$

p = .3
$\mu = 3.33$
$\sigma = 2.79$

p = .4
$\mu = 2.5$
$\sigma = 1.94$

p = .5
$\mu = 2$
$\sigma = 1.41$

p = .6
$\mu = 1.67$
$\sigma = 1.05$

p = .7
$\mu = 1.43$
$\sigma = 0.78$

p = .8
$\mu = 1.25$
$\sigma = 0.56$

p = .9
$\mu = 1.11$
$\sigma = 0.35$

5. What do you notice about the shapes of the geometric distributions as the probability of success (defective) increases?

6. What do you notice about the means & standard deviations as the probability of success increases?

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