Section 3.4: Cont'd

Wednesday, January 31, 2018 4:24 PM

recall from last time:

sampling without replacement from a case of 12 bottles of wine, 5 spoiled

sample 3 bottles

hypergeometric with $N = 12$, $M = 5$, $N - M = 7$, $n = 3$, $k = x$, the random variable

so $p(x) = \dfrac{{}_5C_x \; {}_7C_{3-x}}{{}_{12}C_3}$

x	$p(x)$
0	$\frac{7}{44} \approx 0.159091$
1	$\frac{21}{44} \approx 0.477273$
2	$\frac{7}{22} \approx 0.318182$
3	$\frac{1}{22} \approx 0.045455$

note: sum is one

what is the mean value of x?

$$\mu = n\left(\frac{M}{N}\right) = 3\left(\frac{5}{12}\right) = 1.25$$

What is the standard deviation of x?

$$\sigma^2 = n\left(\frac{M}{N}\right)\left(\frac{N-M}{N}\right)\left(\frac{N-n}{N-1}\right)$$

$$= 3\left(\frac{5}{12}\right)\left(\frac{7}{12}\right)\left(\frac{9}{11}\right)$$

$$\sigma = 0.772$$

A case of wine will be rejected if, when 3 bottles are randomly sampled, one or more bottles is found to be spoiled. What is the probability that a case with 5 spoiled bottles will be accepted?

$P(x=0) = 15.9\%$ (ouch!)