X = The number of chicks which survive

Y = The number of chicks which hatch but don’t survive

p is the probability for hatching and s is the probability for survive

We seek the joint PMF P(X = i, Y = j) for nonnegative integers i and j. we know the eggs can be thought of as independent Bernoulli trials with probability “ps” of success for each, therefore.

Here, X and Y are not independent. This follows immediately from thinking about an extreme case: if X = n, then clearly Y = 0. So they are not independent.

Conditional on N = i + j, the events X = i and Y = j are exactly the same event,

so keeping both is redundant. We’ll keep X = i; the rest is a matter of plugging

in the Binomial PMF to get P(X = i|N = i + j)