M 362K Synopses for 2/26

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The geometric distribution has the probability function $Pr(X = k) = p * (1 - p)^k$. X is called geometric random variable with parameter p. The expected value is $E[X] = \frac{1-p}{p}$ and the variance is $Var[X] = \frac{1-p}{p^2}$

A negative binomial process means

(a) The trials are identical

(b) Each trial is independent

(c) The random variable M denotes the number of failures prior to the r^{th} success

(d) The probability of success is p and the probability of failure is $q = 1 - p$

Such distribution is given by $Pr(M = k) = {}_{r+k-1}C_k p^r * (1 - p)^k$. The expected value of failure is $E[M] = r * \frac{1-p}{p}$ and the variance is $Var[M] = r * \frac{1-p}{p^2}$

The hyper-geometric distribution is given by $Pr(X = k) = \frac{{}_GC_k * {}_BC_{n-k}}{{}_{G+B}C_n}$ where X is a hyper-geometric random variable. The expected value is given by $E[X] = n * \left(\frac{B}{B+G}\right)$ and the variance is given by $Var[X] = n * \left(\frac{B}{B+G}\right) * \left(\frac{G}{B+G}\right) * \left(\frac{B+G-n}{B+G-1}\right)$.