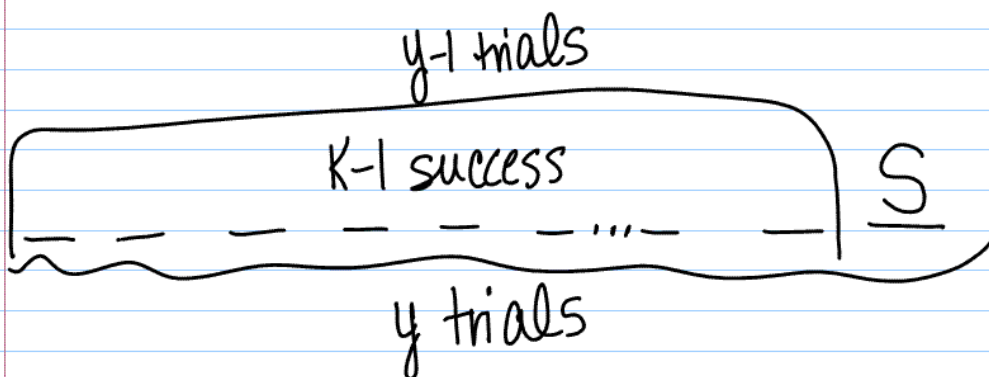
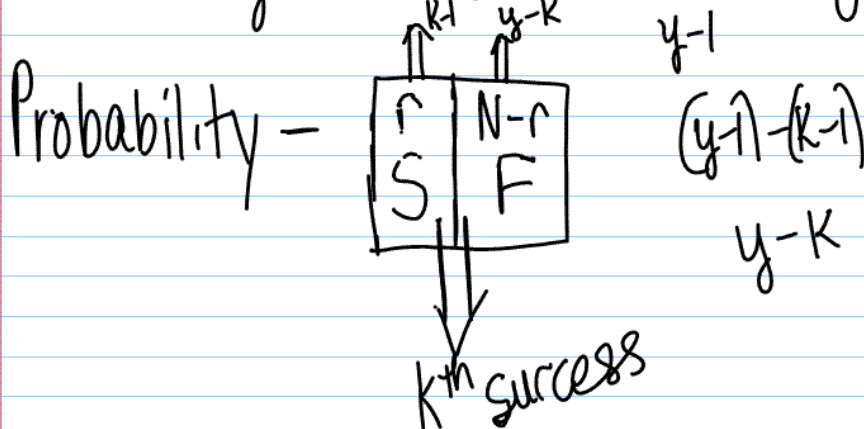


# Negative Hypergeometric Distribution

Note Title

10/13/2008

Length of Time Before Steely Dan  
50 songs out of 3000 songs



$P(y-1 \text{ trials with } k-1 \text{ successes} \cap y^{\text{th}} \text{ trial is a success})$

$P(y-1 \text{ trials with } k-1 \text{ success}) P(y^{\text{th}} \text{ trial is a success} \mid y-1 \text{ trials with } k-1 \text{ successes})$

$$= \frac{\binom{r}{k-1} \binom{N-r}{y-k}}{\binom{N}{y-1}} \cdot \frac{r-(k-1)}{N-(y-1)}$$

$$= \frac{\binom{y-1}{k-1} \binom{N-y}{r-k}}{\binom{N}{r}} \quad y = k, k+1, \dots, \boxed{\text{upper bound}}$$

(2)

15	25
Y	NY

success = yellow ball

(a)  $k=3$   $P(Y=7) = 0.1323$

(b)  $k=3$   $P(Y=10) = 0.0774$

(c)  $k=3, r=15, N=40$

$$\mu = 3 \left( \frac{40+1}{15+1} \right) = 7.6875$$

$$\sigma^2 = \frac{3(40+1)(40-15)(15+1-3)}{(15+1)^2(15+2)} = 9.1854$$

③  $N=50, r=5$

(a)  $k=2 \quad P(Y=10) = 0.0420$

(b)  $k=3 \quad P(Y \leq 25) = 0.5$

(c)  $k=2 \quad E(Y) = k \left( \frac{N+1}{r+1} \right) = 2 \cdot \frac{51}{6} = 17$

(d)  $k=2 \quad \sigma^2 = \frac{2(51)(45)(4)}{6^2(7)} = 72.8571$