An urn contains 3 blue marbles and 2 yellow marbles. Draw with replacement until 2 blue marbles have been obtained.

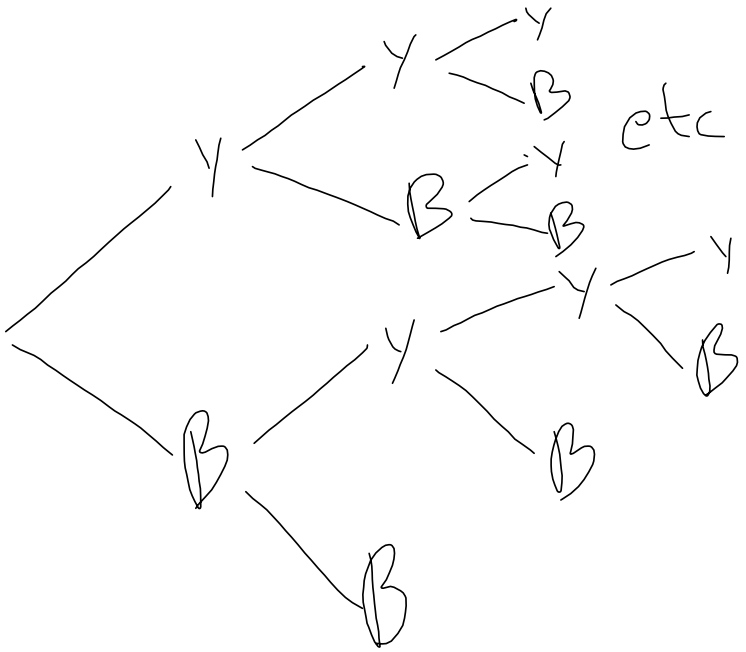
What is the probability that it takes 4 draws to obtain 2 blue marbles?

$\frac{108}{625}$

BYYB
YBYB
YYBB

$P(BYYB) = \frac{3}{5} \cdot \frac{2}{3} \cdot \frac{2}{5} \cdot \frac{3}{5}$

$= \frac{36}{625}$


Y
Y
Y
B
B
Y
B
etc
Y
Y
B
Y
B
B
B

Fix k successes to stop

x is # trials to k successes

Prob for some x:

By x-1 st trial, we've k-1 successes

$$b^*(x;k,p) = b(k-1, x-1, p) \cdot p$$

$$= \binom{x-1}{k-1} p^{k-1} q^{(x-1)-(k-1)} \cdot p$$

$$= \binom{x-1}{k-1} p^k q^{x-k}$$

$$b(x;n,p) = \binom{n}{x} p^x q^{n-x}$$

$x = k, k+1, \ldots$

q: # trials

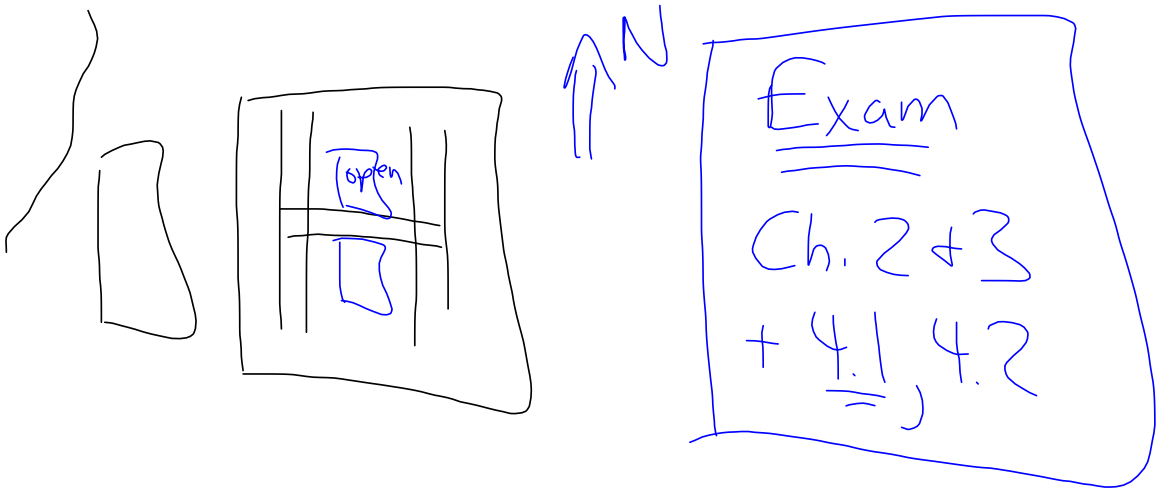
k: # successes

For our problem,

$$f(4;2,\tfrac{3}{5}) = \binom{4-1}{2-1}\left(\tfrac{3}{5}\right)^2\left(\tfrac{2}{5}\right)^{4-2} \qquad \binom{3}{1} = \frac{3!}{1!(3-1)!}$$

$$B(i\sim) = \binom{3}{1}\frac{36}{625} \qquad \binom{3}{2} = \binom{3}{1}$$

$$= \frac{108}{625}$$


open
N
Exam
Ch. 2+3
+ 4.1, 4.2

Prob that an accident is due to distracted driving is 0.8.

427 crashes $\rightarrow (.8)(427) = 342$


N(2,1;
N(;0,1)