11/31/19 - 1

$P(A|B)P(B) = P(A \cap B)$

$P(U) = .005$

$P(\bar{U}) = .995$

$P(+|U) = .99$

$P(-|\bar{U}) = .99$

WANT $P(U|+) = \frac{P(U \cap +)}{P(+)}$

$P(U \cap +) = P(+|U)P(U) = .99 \times .005 = .005$

$P(\bar{U} \cap +) = P(+|\bar{U})P(\bar{U}) = .01 \times .995 = .01$

$P(+) = .005 + .01 = .015$

$P(U|+) = \frac{.005}{.015} = 1/3$

	# MADE	% BAD	# BAD
A	20,000	5%	1,000
B	30,000	3%	900
C	50,000	1%	500
	100,000		2,400

$$P(A|BAD) = \frac{1000}{2400} = \frac{1}{24}$$

$$P(B|BAD) = \frac{9}{24}$$

$$P(C|BAD) = \frac{5}{24}$$

$$P_n(K) = \binom{n}{k} p^k (1-p)^{n-k}$$

COMBINATION "CHOOSE" $\binom{n}{k} = \frac{n!}{k!(n-k)!}$

4 TOSSES OF FAIR COIN $n=4, p=\frac{1}{2}$

$$\binom{4}{0} = \frac{4!}{4!0!} = 1 \quad \binom{4}{1} = \frac{4!}{3!1!} = 4 \quad \binom{4}{2} = 6 \quad \binom{4}{3} = 4 \quad \binom{4}{4} = 1$$

$$\sum_{k=0}^{4} \binom{4}{k} = 1+4+6+4+1 = 16 = 2^4$$

$$P(0\text{HEADS}) = \binom{4}{0} p^0 (1-p)^4 = \frac{1}{16}$$

$$P(1\text{HEAD}) = \binom{4}{1}\left(\frac{1}{2}\right)^1\left(\frac{1}{2}\right)^3 = \frac{4}{16}$$

$$P(2\text{HEADS}) = \frac{6}{16} = .375$$

UNFAIR $p = .1$

$$p(2\text{HEADS}) = P_4(2) = \binom{4}{2} \cdot .1^2 \cdot .9^2 = 6 \times .0081 = .05$$

$$P_4(1) = \binom{4}{1} \cdot .1^1 \cdot .9^3 = 4 \times .729 \simeq .29$$

$$P_4(0) = .9^4 \simeq .6$$

TOSS A FAIR DIE 6 TIMES.

WANT PROB WE SAW EACH FACE ONCE

$$P = \binom{6}{1\,1\,1\,1\,1\,1} \left(\frac{1}{6}\right)^6 = 6! \left(\frac{1}{6}\right)^6 =$$

$$\frac{6!}{1!\,1!\,1!\,1!\,1!\,1!}$$

PROB (WE SEE ONE 1, 2-2, 3-3, 0-ed)

$$\underbrace{\binom{6}{1\,2\,3\,0\,0\,0}}_{\frac{6!}{1!\,2!\,3!\,0!\,0!\,0!}} \left(\frac{1}{6}\right)^6 = 60 \cdot \left(\frac{1}{6}\right)^6$$

$$= \frac{720}{1 \cdot 2 \cdot 6 \cdot 1 \cdot 1 \cdot 1} = 60$$