

PROBABILITY MODELS (10/29/19)

Read: DD A

chpt 1-3; B chpt 1-10

LN pg 1-136

Quiz 4 due tonight

HW#2 due Thursday

Today

R-37

R-51

R-52

$$P(Y) = \frac{81}{106} = 76\%$$

$$P(Y|F) = \frac{29}{49} = 59\%$$

$$P(Y|M) = \frac{52}{57} = 91\%$$

(not indep)

Q: Association between [ⓐ]gender and MLP or are they independent?

A: ⓐ, MLP are strongly dependent (strong association)

$$P(DP) \xleftarrow{\text{death penalty}} = \frac{36}{326} = 11.0\% \quad (DP = \text{outcome})$$

$$P(DP|DW) \xleftarrow{\text{definite}} = \frac{19}{160} = 11.9\%$$

(DW or DB = treatment)

$$P(DP|DB) = \frac{17}{166} = 10.2\%$$

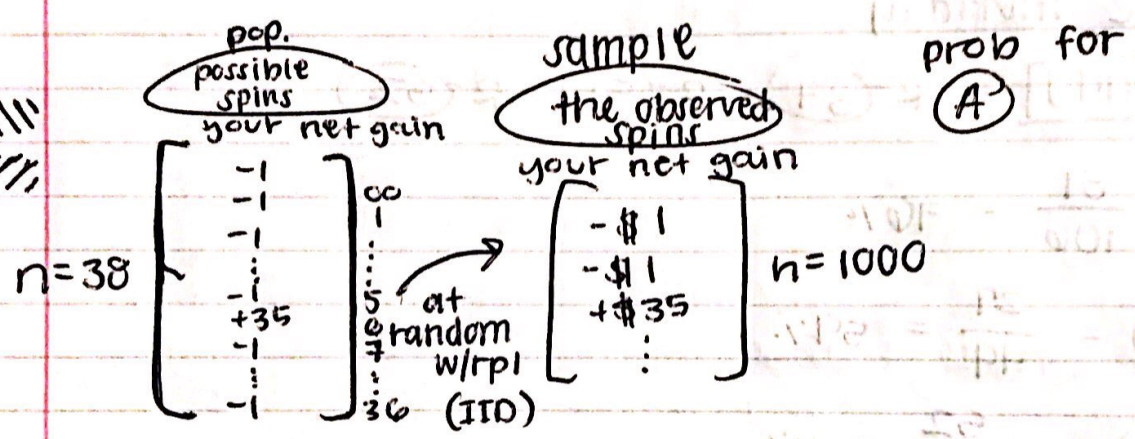
assoc? yes: (DB \rightarrow DW) DP \uparrow (!)

R-52 ROULETTE

$P(\text{coming out ahead, 1 play } \textcircled{A}) = \frac{1}{38} = 2.5\%$

ELM? yes

$P(\text{ditto } \textcircled{B}) = \frac{2}{38} = 5\%$



real world
 your net gain after 1000 \$1 bets on a
 single # is like the sum \$ of n=1000 IID
 drawn from pop. \underline{P}

math world

"new"
pop mean $\mu =$

pop SD $\sigma =$

$$\mu = \frac{\overbrace{(-1) + \dots + (-1)}^{37} + \underbrace{(35)}_{1}}{38}$$

$$= \frac{-82}{38} = -\$0.05$$

on any single \$1 bet, you expect to win
 \$ -0.05 = μ , give or take

$\sigma = ?$

Math
fact:

if pop. has only 2 values
in it,

$$\sigma = \left(\overset{(+35)}{\text{larger value}} - \overset{(-1)}{\text{smaller value}} \right) \sqrt{\overset{37/38}{\text{prop of larger value}} \left(\overset{1/38}{\text{prop of smaller value}} \right)}$$