

this probability
time: models

next for sums
time: and means

read: ~~Q~~ A
ch. 1-3; B ch.

STAT 7
29 Oct 19

1-10 LN pp. 1-136 ①

quiz 4 due tonight

homework 2: new due date: this Thu night
31 Oct

today: LN pp. 113 → R-37, R-51, R-52

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

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

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

Q (not indep!)
association
between
gender (G)
& MLP,
or are

they independent? (A) (G), (MLP)

strongly dependent (strong association exists)

$P(\text{JP}) = \frac{36}{326} \approx 11.0\%$
(JP = "JP" outcome)

$P(\text{JP} | \text{DW}) = \frac{19}{160} \approx 11.9\%$
(DW or JP = treatment)

$P(\text{JP} | \text{DB}) = \frac{17}{166} \approx 10.2\%$

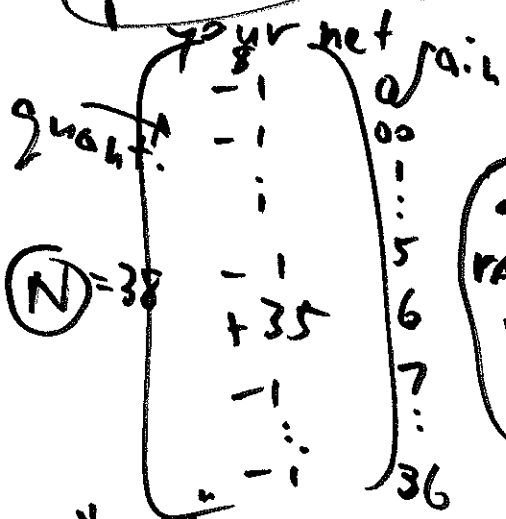
assoc. ? yes : (DB → DW) JP ↑ (!)

R-52 Roulette $P(\text{winning out ahead, 1 pt} > \text{A}) = \frac{1}{38}$
 ELM: yes

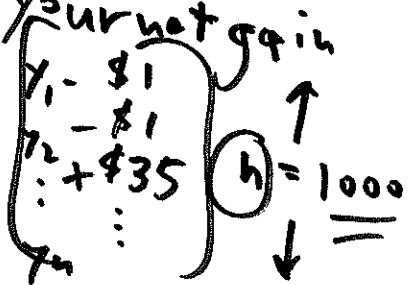
$P(\text{ditto B}) = \frac{2}{38} \approx 5\% = 2.5\%$

~~real world (natural language)~~
 your net gain after 1,000 \$1 bets
 on a single # is like the sum of less ambiguous
 of $n = 1,000$ IID draws from pop. P

pop. possible spins



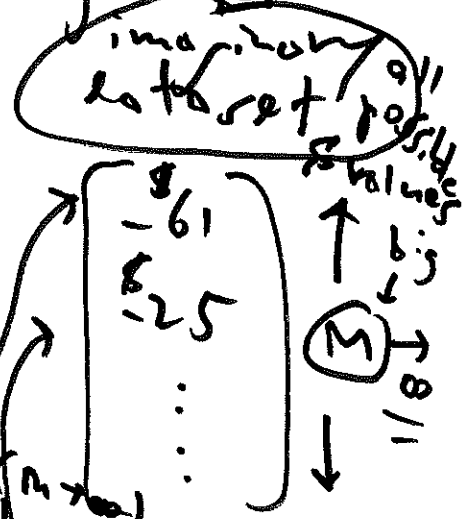
sample the observed spins



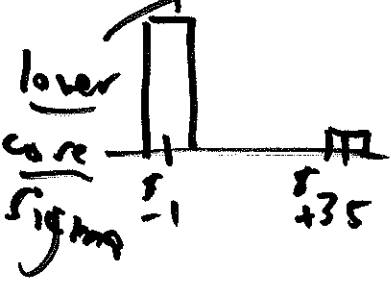
at random with repl.

sum $S = ?$
(ex. $8 - 61$)

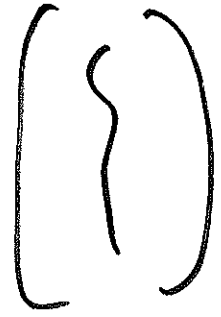
prob. model for simple #6



pop. median $\mu = -0.05$
pop. std $\sigma = \$5.76$



pop. hist.



sum $S = ?$
(ex. $8 - 25$)

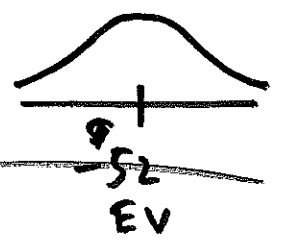
$n = 1,000$

(low-
high-
SD)

expected value of $S = E_{IID}(S) = \$52$

standard error of $S = \$182$

by-
the-
hist



R-53-54

$$\bar{y} = \frac{1}{n} \sum_{i=1}^n y_i = \frac{S}{n}$$

$$\mu = \frac{\overbrace{(-11) + \dots + (-11)}^{37} + \overbrace{(+35)}^2}{38} \quad (4)$$

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

oh say single \$1 bet, you

expect to win $(-0.05) = \mu$

give or take about \$5.76 (σ)

$\sigma = ?$

math fact: if pop. has only 2 values in it,

$$\sigma = \left(\left(\begin{matrix} \text{larger} \\ \text{value} \end{matrix} \right) - \left(\begin{matrix} \text{smaller} \\ \text{value} \end{matrix} \right) \right) \sqrt{\left(\begin{matrix} \text{proportion} \\ \text{of larger} \\ \text{value} \end{matrix} \right) \left(\begin{matrix} \text{prop} \\ \text{of smaller} \\ \text{value} \end{matrix} \right)}$$

$\left(\begin{matrix} +35 \\ \text{larger} \\ \text{value} \end{matrix} \right) - \left(\begin{matrix} -11 \\ \text{smaller} \\ \text{value} \end{matrix} \right)$

$\sqrt{\left(\begin{matrix} \frac{37}{38} \\ \text{prop. of larger} \\ \text{value} \end{matrix} \right) \left(\begin{matrix} \frac{2}{38} \\ \text{prop. of smaller} \\ \text{value} \end{matrix} \right)}$