STANDARD ERROR, CENTRAL LIMIT THEOREM (10/31/19)

Read: DD (A) chpt 1-3
(B) chpt 1-10

Take Home Midterm due Sun Night 10 Nov 19

LN pg 1-136

DD extra office hours for midterm daily starting Mon

HW 2 due tonight

$$\frac{100\$}{6\$} = 16 \text{ hours}$$

$$= P_F(S > \$0)$$

P_F(coming out ahead after 1000 $1 bets on single #) = ?

↑ Frequentist

2 WAYS

1. math (1710) (since 1950)
2. computer simulation formula (2) R-22

L-122

$$\begin{pmatrix}\text{expected}\\ \text{value of } S\end{pmatrix} = \begin{matrix}\text{EV of}\\ S\end{matrix} = E_{IID}(S) = ?$$

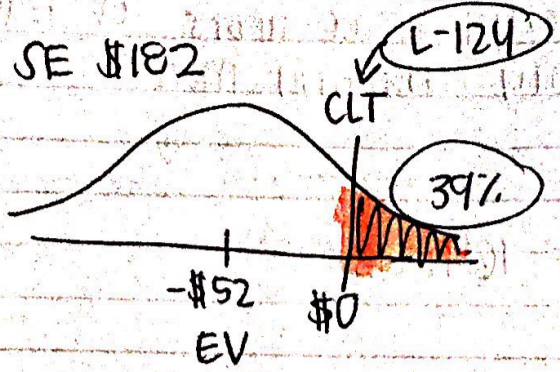
Math Fact

$$E_{IID}(S) = \begin{pmatrix}\#\text{ of}\\ \text{draws}\end{pmatrix}\begin{pmatrix}\text{pop}\\ \text{mean}\end{pmatrix} = n\mu$$

(1000)(-0.05$)

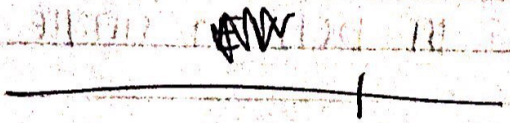
$E_{IID}(\$) = -\$52$ | Utility (1730)

SE $182



long run hist of $

After $n = 1000$ $1 bets on single #, you expect to have won



de Moivre (1710)

$$+0.29 = \frac{(\$0) - (-\$52)}{\$182}$$

$\left(\begin{matrix}\text{EV of} \\ \text{sum}\end{matrix}\right) = n\mu = -\$52$, give or take about

$\left(\begin{matrix}\text{standard error} \\ \text{of } \$\end{matrix}\right) = (\text{SE of } \$) = SE_{IID}(\$) = ?$

math fact $SE_{IID}(\$) = \$$ (noisy) is uncertain; $SE_{IID}(\$)$ represents how much uncertainty (noise) we have about $\$$

signal information ↑ — uncertainty (noise) ↓

S is uncertain b/c $S = (y_1 + \ldots + y_n)$ and each of the y_n is uncertain

the pop SD or σ represents how much uncertainty we have about each of the y_n

as σ ↑ — $SE_{IID}(S)$ ↑

N x
M x
σ ↑ — $SE_{IID}(S)$ ↑
n ↑
M x

$$SE_{IID}(S) = \sigma\sqrt{n} = (\$5.76)\sqrt{1000} = \$182$$

R-22