

* Ch 13 - 16 leftovers?

* Ch 17

+ short speech

+ discussion?

PracticeTest!!due
wed
by midnight

Exam 3 Thurs 4/9

Ch 13, 14, 15
16, 17, 18

→ Canvas Quiz

Ch 17 : Idea for Square Root Law

$$5 \pm 3$$

$$\text{AVE(tickets)} = 5$$

$$\text{SD(tickets)} = 3$$

how many tickets
actual numbers?repeated draws
(with replacement)take sum
(total)

$$500 + 30$$

$$300 < 500 + 30$$

about right

too small

about right

p. 291

$$30 = 3 \cdot \sqrt{100}$$

The Square Root Law:

The give or take value
for the sum of draws
from a box is

$$\text{SE(sum)} = \text{SD(box)} \cdot \sqrt{\# \text{draws}}$$

The expected sum of
draws from a box is

$$\text{AVE(box)} \cdot (\# \text{draws})$$

✓ A3

discussion

$$\frac{32}{38} + \text{normal curve} \quad \text{SE(sum)} \quad \text{SE(other things) later}$$

A3 model gambling problem

$$\text{pays } \frac{35}{38} \text{ to } 1 \quad \text{"bet on 17"} \\ \text{chance to win once is } \frac{1}{38}$$

$$\begin{array}{c} \rightarrow 100 \text{ after 100} \\ \text{net gain (\$)} \\ \text{sum} \end{array}$$

$$\text{Expected net gain} = ? \\ \text{Expected sum of draws} = \text{ave(box)} \cdot \frac{\# \text{draws}}{100}$$

$$\frac{35 + (-1) + \dots + (-1)}{38} = \frac{35 - 37}{38} = \frac{-2}{38} = -\frac{1}{19} = -0.053$$

$$\rightarrow = (-0.053)(100) = 5.3 \text{ \&} \\ = -5.30 = \text{expected net gain in 100 plays}$$

82

$$\begin{array}{c} [+1] [-1] \\ \rightarrow 100 \\ \text{ave(box)} = 0 \end{array}$$

$$\text{net gain in 100 draws} = ? \\ = \text{ave(box)} \cdot \# \text{draws} = 0 \quad \text{"fair game"}$$

$$\text{give or take } \frac{\$10}{\$10} \quad \uparrow \text{SE(sum)}$$

$$= \frac{\text{SD(box)}}{\sqrt{100}} \cdot \sqrt{100} = 1 \cdot \sqrt{100} = 10$$

"short cut" for SD box with 2 kinds of tickets

$$\left(+1 - (-1) \right) \sqrt{\frac{1}{2} \cdot \frac{1}{2}} = \sqrt{\frac{1}{2}} = \frac{1}{\sqrt{2}} = 0.707$$

$$\text{net gain (gambling)} \leftrightarrow \text{sum of draws} \quad \text{dollars on box}$$

D4

p 299

$$\begin{array}{c} [2] [-1] \\ \rightarrow 100 \\ 12 \quad 26 \end{array}$$

$$\begin{array}{c} [+1] [-1] \\ \rightarrow 100 \\ 18 \quad 20 \end{array}$$

$$\text{section} \\ \text{"pays 2 to 1"} \\ \text{P(win)} = \frac{12}{38}$$

$$\text{red} \\ \text{"pays even"} \\ \text{P(win)} = \frac{18}{38}$$

$$\text{ave(box)} = \frac{18 - 20}{38} = \frac{-2}{38} = -0.053$$

$$\text{SD(box)} = \sqrt{\frac{1}{2} \cdot \frac{20}{38}} = \sqrt{\frac{10}{38}} = 0.555$$

$$\text{shortcut} = 2 \sqrt{\frac{10}{38}} \approx 0.998 \approx 1$$

$$\text{expected(sum)} = (-0.053) \cdot 25000 = -1315.79$$

$$\text{SE(sum)} = 1 \cdot \sqrt{25000} = 158.11$$

SD normal curve for net gain

$$z = \frac{-1000 - (-1315.79)}{158.11} \approx \frac{315.79}{158.11} \approx 2$$

$$z \uparrow \text{Area} \quad 2 \uparrow 95.45$$

$$= 50 + \frac{1}{2} 95.45 \approx 98\%$$

$$\text{SD(box)} \quad \text{shortcut often net win/loss}$$

$$\text{no shortcut}$$

$$2\% \quad 98\%$$

$$2\% \quad 98\%$$