

Review for Quiz 7

1. Suppose you draw with replacement from the following box of numbers: [2 , 2 , 3 , 3 , 4]. Fill in the blanks and explain.

a) As the number of draws gets larger and larger, the data histogram for draws will look more and more like the box histogram

b) As the number of draws gets larger and larger, the probability histogram for the sum of the draws will look more and more like the normal curve.

$$\left(\frac{\text{sum} - \text{EV}}{\text{SE}} \right)$$

2. A pair of dice is rolled. If you get two "sixes" then you win \$44; otherwise, you lose \$1. You repeat this game 100 times.

a) Construct an appropriate box model.

$$\frac{1}{36}$$

$\boxed{44, 35, -1}$ → Draw 100 times & consider the sum.

b) How much do you expect to win?

$$\text{EV for sum} = \text{Box AV} \times 100 = \frac{1}{4} \times 100 = 25$$

c) Because this is a chance process, your actual winnings may differ from your expected total. What is the likely size of the difference?

$$\text{sum of draws} = \text{EV} \pm \text{SE} = \$25 \pm \text{SE for sum}$$

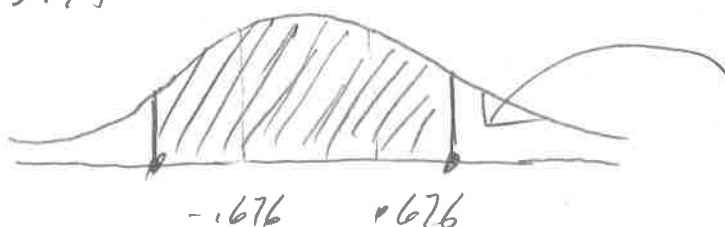
$$\text{SE for sum} = \text{Box SD} \times \sqrt{100} = [44 - (-1)] \sqrt{\frac{1}{36} \times \frac{35}{36}} \times 10 = 10$$

d) Find the probability of winning more than \$75

$$= \$73.95$$

$$\frac{75 - 25}{73.95} = 0.676$$

$$P(0.676) \approx 50\%$$



$$\boxed{25\%}$$

3. Four hundred draws will be made at random with replacement from the box $[1, 3, 5, 7]$.

$$\text{Box AU} = 4, \quad \text{Box SD} = \sqrt{5} = 2.236$$

a) Find the chance that the sum of the draws will be more than 1500.

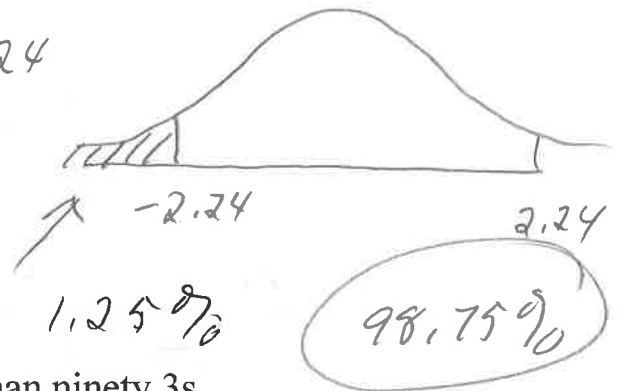
$$\text{EV for sum} = \text{Box AU} \times 400 = 1600$$

$$\text{SE for sum} = \text{Box SD} \times \sqrt{400} = 44.72$$

Normal Approximation ϕ

$$\frac{1500 - 1600}{44.72} = -2.24$$

$$A(2.24) = 97 \frac{1}{2} \%$$



b) Find the chance that there will be fewer than ninety 3s.

$[1, 0, 0, 0]$ → Draw 400 & consider sum of draws.

$$\text{Box AU} = \frac{1}{4}$$

$$\text{Box SD} = \sqrt{\frac{1}{4} \cdot \frac{3}{4}} = \frac{\sqrt{3}}{4} = .433$$

$$\text{EV for sum} = \frac{1}{4} \times 400 = 100$$

$$\text{SE for sum} = \text{Box SD} \times \sqrt{100} = 4.33$$

$$\frac{90 - 100}{4.33} = -2.3$$

$$A(2.3) = 97.86\%$$

