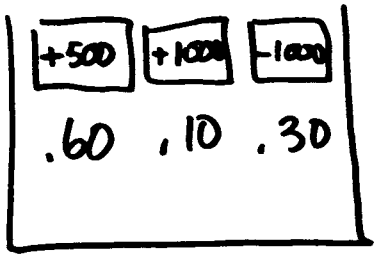
You have $1000 to invest and your friend comes up to you with an offer:

There is a 60% chance that after a year your investment will have grown to exactly $1500. And there is a 10% chance that your investment will grow to $2000, but there is also a 30% chance that you will lose all of your money.

What is the expected value of your investment after a year?



$= +100$ or $1,100

Suppose 25 persons invest $1000 each with your friend. What is the expected value of their total investment after a year?

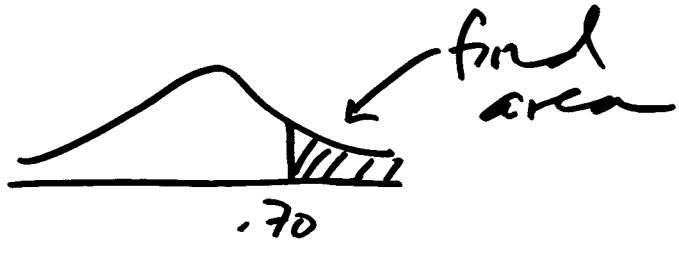
$25 \times 100 = 2,500$ or $27,500

What is the standard error of the total investment?

$\sqrt{25} * 734.84 = 3,674.23$

What is the chance that the value of their total investment will exceed $5,000? (or $30,000)

$$z = \frac{5000 - 2500}{3,674.23} = .68 \approx .70$$



We can compute chances and probabilities for random processes using the approximate normality of the sum of draws. An example: consider the game of roulette in Las Vegas. There are 38 slots for a ball to fall into at random. 18 of the slots are colored red. 18 of the slots are colored black. 2 of the slots are colored green. For the simplest bet, either red or black, you bet $5. You will win $5 if the ball lands in your colored slot. You will lose your $5 if it falls in a color other than yours.

i. Sketch a reasonable box model for the game of roulette.

+5	-5
18/38	20/38

ii. What is the box average for this game?

$$\left(+5 * \frac{18}{38}\right) + \left(-5 * \frac{20}{38}\right) = -.2632$$

iii. What is the box standard deviation for this game?

$$\sqrt{\left(\frac{18}{38}\right)(5--.2632)^2 + \left(\frac{20}{38}\right)(-5--.2632)^2}$$

$$= 4.993$$

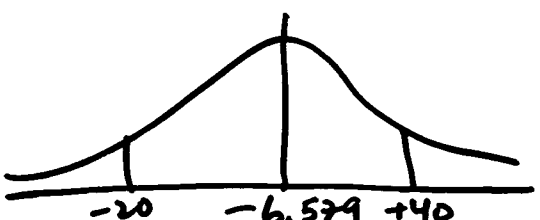
iv. Suppose you were to play the game 25 times. What is the probability (or chance) that you will break even (win $0) or do better? What is the chance that you will not break even?

Total after 25 times = $25 \times -.2632 = -6.579$

$SE = \sqrt{25} * 4.993 = 24.965$

$$z = \frac{0 - -6.579}{24.965} = .2635 \approx .25$$ find area to the right of this

v. After playing 25 times, what is the probability (or chance) that your net winnings fall between -$20 and $40?



find z scores for -20 and +40

http://www.engr.csufresno.edu/~patague/cgi-bin/Roulette.html (a roulette simulation)
http://www.vegas.com/gaming/gaming_tips/photos/roulette4.jpg (a picture of a real wheel)