Complement

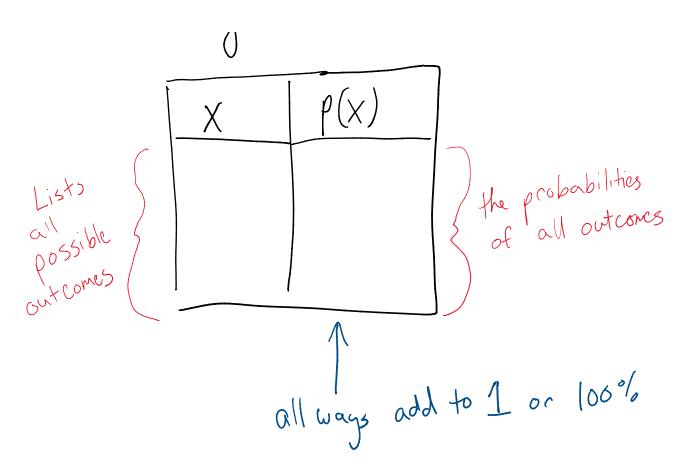
Complement means the opposite event

$$P(A') = P(A') = |-P(A)|$$

"and"

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Probability distribution function "PDF"



Expected Value is the average of the PDF. Expected value represents the total winnings/losses, if you were to see this experiment performed an infinite number of times.

Example -

The probability of being born a male is not 50% as many think. It's actually closer to 51.2%. Let's answer a few questions...

- A. Write out the outcome of being born a male, in a probability talk.
- B. Write out and solve for the complement of being born a male.
- C. You are going to have 2 children. What is the probability of having a male "and" a male.
- D. You are going to have one child. What is the probability of having a Male "or" Not a male.
- E. Create a PDF of the different birth outcomes, using the information provided.

Example - Your doctors said that since you've given up smoking, you should pick up another addictive practice. So, gambling is what you both decided on.

Your doctor said that he has a patient that is giving birth soon. You bet \$10 that it will be a boy. If it's a boy, you win \$10. If it's not a boy, you loose \$10.

- A. Write out a PDF for the winnings/losses and their probabilities.
- B. What is the expected value?
- C. If you were to play this game 100 times (\$1000), how much would you win/lose?

Example - In Roulette, the wheel has 18 red, 18 black, and 2 green colors. You have an equal probability of landing on any spot. If you bet \$1, then you get \$1 back. If you lose, then you get nothing.

- A. Write out a PDF for this game.
- B. If you go to Vegas and play this game, what is the expected value of your winnings/losses.
- C. You play this game 100 times. How much do you win or lose?

Roulette- You play the same game, but you bet on landing on green. If you land on green, you win 17 times the amount. So, if you bet \$1, you win \$17.

- A. Write out a PDF
- B. Solve for expected value.

Super lotto - The CA super lotto has the odds of 1 in 41,416,353 to win the jackpot. The price to play is \$1 per number. The current jackpot is at \$11 million. If the numbers were to stay this way, what would your expected value be?

Is there a point when the lotto becomes a "good" game to play?