Examples for the tricks #5 to #8

STA624.01, Applied Stochastic Processes

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Example for a trick #5 Experiment: Rolling a fair die. Let A_1 be an event that a die turns $2, 3$, or 4, and let A_2 be an event that a die turns $1, 2$, or 3. Then A_1^c is an event that a die turns $1, 5$, or 6, and A_2^c is an event that a die turns $4, 5$, or 6. Also A_1A_2 is an event that a die turns 2,, or 3. Thus, $(A_1A_2)^c$ is an event that a die turns $1, 4, 5$, or 6 which is equal to $A_1^c \cup A_2^c$.

Example for a trick #6 One can find some examples on line like `https://onlinecourses.science.psu.edu/stat414/node/43`.

Example for a trick #7 Experiment: Rolling a fair die. Let A_1 be an event that a die turns $2, 3$, or 4, and let A_2 be an event that a die turns $1, 2$, or 3. We call success if a die turns $1, 2, 3$, or 4 which is $A_1 \cup A_2$. You can approximate the $P(A_1|A_1 \cup A_2)$ by rolling the die many times and computing the frequency of the die turning $2, 3$, or 4 given that the die is $1, 2, 3$, or 4.

Example for a trick #8 Suppose you are playing a coin-tossing game in which you continue to flip a coin until it first turns up heads. Consider the potential third flip in this game. Given that the game reaches a third flip, what is a probability that it turns up heads on the third flip? Overall, what is the probability that there is a third flip and that flip turns up head? What is the probability that the game reaches at most ten hundreds flip?