**Homework 2** Due October 22, 2021

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**Problem 2.1**

A die is rolled twice. What is the probability that the sum of the faces is greater than 5 (event *E*), given that

1. the first outcome was a 3?

1. the first outcome was greater than 4?
2. the first outcome was 1?
3. the first outcome was less than 5?

**Problem 2.2**

There are two urns. In urn *I* there are 5 white balls and 6 black balls, in urn *II* there are 4 white balls and 3 black balls. 2 balls from urn *I* are picked at random and transferred in urn *II*. Then, two balls are chosen at random from urn *II*.

What is the probability that both balls are black?

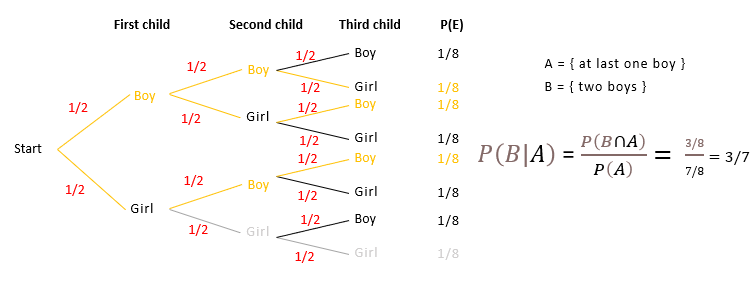
What is the probability that balls of the same color were transferred from *I* to urn *II* if balls chosen from urn *II* are of different color?

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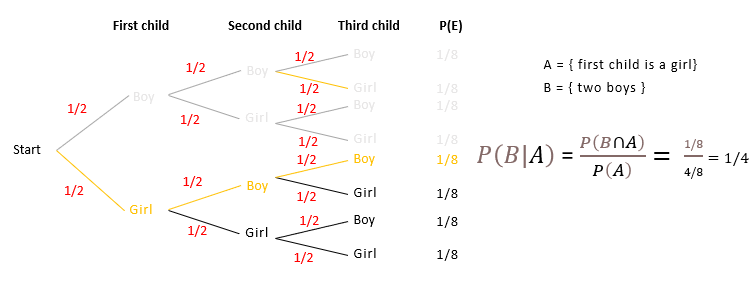
**Problem 2.3**

What is the probability that a family of three children has

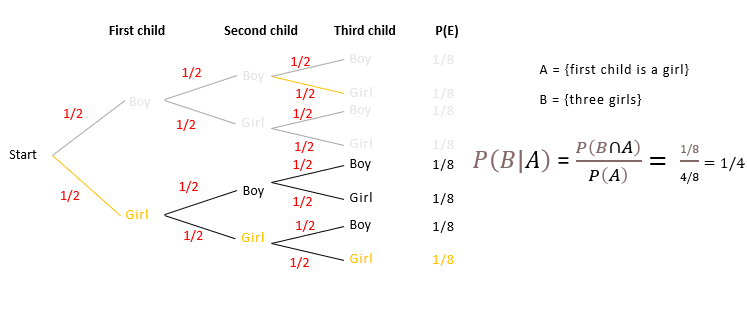
1. two boys given that it has at least one boy?



1. two boys given that the first child is a girl?



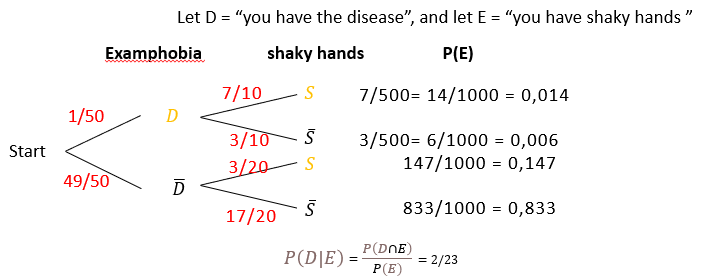
1. three girls, given that the first child is a girl?



**Problem 2.4**

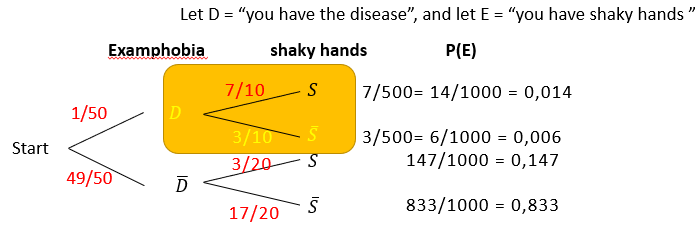
**Examphobia** is a rare disease in which the victim has the delusion that he or she is being subjected to an intense mathematical examination. A person selected uniformly at random has examphobia with probability 1*/*50. A person with examphobia has shaky hands with probability 7*/*10*.*A person without examphobia has shaky hands with probability 3*/*20.

What is the probability that a person selected uniformly at random has examphobia, given that he or she has shaky hands?



*=*

What is probability that a person doesn’t have shaky hands given that he or she has examphobia?



**Problem 2.5**

Find the probability that in a poker hand (5 cards) you will have

1. royal flush (ten, jack, queen, king ace in one suit)
2. straight flush (five cards in a sequence in a single suit, but no royal flush)
3. flush (five cards in a single suit, but not a straight or royal flush)
4. one pair?

**Problem 2.6**

Each of the four engines of an airplane are functioning correctly on a given flight with probability of 0.99, and the engines function independently of each other. Assume that the plane can make a safe landing if at least two of its engines are functioning properly. What is the probability that the engines will allow a safe landing?

**Problem 2.7**

BONUS PROBLEM.

Two cowboys A and B decide to solve a dispute with a duel. Cowboy A hits his target 1/3 of the time. Cowboy B hits the target 2/3 of the time. It is decided that A will take the first shot, cowboy B will take the second shot (if still alive). This will continue until there is only one left alive. Also, a cowboy can not shoot two times in a row. What are cowboy A chances of winning the duel?