Practice 3

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Question 1

You toss four coins.

1. What is the sample space? How many outcomes do we have?
2. What is the probability of each outcome?
3. You want to compute the probability of having four tails. What is the event?
4. What is the probability of of having four tails? Can you apply the multiplication rule to compute this?
5. What is the probability to get heads in at least one toss?
6. Denote A the event of getting heads in tosses 1,2 and 3 (toss 4 can be anything). Denote B the event of getting heads in tosses 3 and 4 (tosses 1 and 2 can be anything). Find $P(A)$ and $P(B)$.
7. What is $P(A \cap B)$? Do you think A and B are independent events?
9. What is $P(A \cup B)$?
10. Find $P(A|B)$ and $P(B|A)$.
11. What is the interpretation of these probabilities?

Question 2

You poll 1000 people and ask 2 questions:

(a) Are you physically active?
(b) Have you ever had a heart attack?

You get the following contingency table (measured in frequencies)

```
##                 active not-active
## heart attack        50         30
## no heart attack    550        370
```

1. What is the probability of being active and having a heart attack? (joint probability)

2. What is the probability of being active? (marginal probability)

3. What is the probability of having a heart attack? (marginal probability)

4. What is the probability of having a heart attack given that you are physically active? (conditional probability)

5. What is the probability of being physically active given that you had a heart attack? (conditional probability)