# Practice 4

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**Question 1**

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 information - 10% of people get a heart attack - 60% of people who had a heart attack were not physically active - 70% of people who did not have a heart attack were physically active

1. Convert these statement to marginal and conditional probabilities.

2. Compute the probability to have no heart attack.

3. Compute the probability to be active given a heart attack.

4. Compute the probability to be not active given no heart attack.

5. Create a tree diagram

6. Compute all joint probabilities (four probabilities in total).

7. Compute all marginal probabilities (four probabilities in total).

8. What is the probability to have a heart attack given that you are active?

9. Apply the Bayes' rule and make sure you get the same answer.

**Question 2**

1. Compute the expectation of a Bernoulli random variable with p = 0.1.

2. What is the general formula for arbitrary p?

3. Compute the variance of a Bernoulli random with p = 0.1.

4. What is the general formula for arbitrary p?

**Question 3**

You have a bag with 7 items, the probability of an item to be defective is 0.2.

1. What type of random variable can be used to represent defectiveness of one item?

2. What type of random variable can be used to represent the number of defective items among these 7?

3. Use the table (see Files/Tables on Quercus) to find the probability to have 3 out of 7 defective items?

4. Use the table to draw the distribution diagram the number of defective items.

5. How would you use this table if I ask you to find the probability to have 3 out of 7 defective items if the probability for a an item to be defective is 0.8?