Pattern Recognition
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Exercises

Theory Sheet 3

Exercise T-3.1: Dependent and Independent Variables

N things are lying in a box, M of them being defective. We draw without returning and consider the following random variables:

- X = Number of defect things in first draw (being 0 or 1)
- Y = Number of defect things in second draw (being 0 or 1)

Are X and Y dependent or independent? Proof your statement.

Exercise T-3.2: Bayes Rule

There are two urns containing colored balls. The first urn contains 50 red balls and 50 blue balls. The second urn contains 30 red balls and 70 blue balls. One of the two urns is randomly chosen (both urns have a probability of 50% of being chosen) and then a ball is drawn at random from one of the two urns. If a red ball is drawn, what is the probability that it comes from the first urn?

Exercise T-3.3: Bayes Rule

An economics consulting firm has created a model to predict recessions. The model predicts a recession with probability 80% when a recession is indeed coming and with probability 10% when no recession is coming. The unconditional probability of falling into a recession is 20%. If the model predicts a recession, what is the probability that a recession will indeed come?