STAT 215A HW#2, Spring 2022

Instructions. This homework assignment consists of two problems (adopted from Quiz#1 of Spring 2018) but you only need to submit your solution to one of them (though attempting to solve both problems for practice is highly recommended). The assignment is due by 3:50 pm on Tuesday, February 22. You are allowed to collaborate in pairs or groups of size three, and submit the assignment (for one of the problems) jointly. In that case, one group member can submit the resulting solution document with the names of the collaborators on the first page (or in the comments section on Canvas). You may also choose to upload your document individually by stating names of your collaborators, if any.

1. Depending on the risk level of home insurance contracts/ policies, an insurance company divided a city into three regions: high risk, medium risk and low risk.

   - About 10% of its customers live in the high risk region where about one fifth of the customers filed a claim last year.
   - About 40% of its customers live in the medium risk region where about 6% of the customers filed a claim last year.
   - Only about 2% of the customers in the low risk region filed a claim last year.

   One of their customers is selected at random. Determine the probability that

   (a) the customer filed a claim last year

   (b) the customer lived in the high risk region, given that the customer filed a claim last year.

2. Assume that three events A, B and C are pairwise independent, each with a positive probability. Prove or disprove each of the following statements:

   (a) The events $A \cup B$ and C are independent.

   (b) The events $A \cap B$ and $C \cap B$ are dependent.