Quantitative Techniques 1 (XOL)

Group Assignment 3

To be submitted by 24th September

Problem 1. An online pizza store has two outlets, Outlet A and Outlet B. Once an online order is placed, with probability 1/3 it comes from Outlet A, and with probability 2/3 it comes from Outlet B. Outlet A takes 15 minutes to prepare the food and then the delivery time is exponentially distributed with an average of 10 minutes. Outlet B takes 10 minutes to prepare the food and then the delivery time is exponentially distributed with an average of 12 minutes. Given that you have already waited 25 minutes after placing the order, and the food has not arrived, what is the probability that your order is coming from Outlet A?

Problem 2. Following are the tasks regarding the case "Increasing COVID-19 Testing Capability though Pooled Testing". You need to consider the Row-pooled test method only. Please do your computation in R.

Task 1: Develop a base model. With this base model, how many tests are needed in the row-pooled test strategy? Find the optimum number of pool size in this case with the infection rate/prevalence being 1%.

Task 2: Can you generate some insights on how the effectiveness of the row pooled testing method changes if the infection rate/prevalence is 2%, 5%, 10%? At which prevalence the row pooled test is no longer effective?