Assignment 12, ST2304

Problem 1 What are the samples size needed to detect a difference between the probability of a binary outcome in two groups with a power of 0.9 if the real probabilities of the outcome in the two groups are

1. $p_1 = 0.001$ and $p = 0.002$?
2. $p_1 = 0.01$ and $p = 0.02$?
3. $p_1 = 0.1$ and $p = 0.2$?
4. Discuss briefly why there is a difference.

Problem 2

1. Make a graph showing the power of a one-sided two-sample t-test as function of the true difference between the means, $\mu_1 - \mu_2$, assuming that $\sigma = 1$ and that the sample size $n = 20$. Hint: You can do this using `curve` but note that `power.t.test` returns a list (see `?power.t.test` and in particular, study the "Value" paragraph).
2. Based on the graph, determine the power of the test if the true difference between the means is zero.
3. Add additional curves to the plot showing the power of the same test but for significance levels $\alpha = 0.01$ and $\alpha = 0.1$, respectively. How does changing significance level α (the probability of type I error) change the power of the test?