1. We have data of control group $X_1, \ldots, X_n \sim N(\mu_x, \sigma_x^2)$. And the data of treatment $Y_1, \ldots, Y_m \sim N(\mu_y, \sigma_y^2)$. These two group of data are independent. We want to compare the mean of control group and treatement group.

   (a) What is the variance of $\bar{X} - \bar{Y}$

   (b) Assume $\sigma_x^2 = \sigma_y^2$. What is the estimated variance of previous question?

   (c) With a significance level 0.05, what is the rejection region of the test of the null hypothesis $H_0 : \mu_x = \mu_y$ versus $H_A : \mu_x > \mu_y$.

   (d) What is the power of the test if $\mu_x = \mu_y + 1$

   (e) Do previous 3 questions again with the extra assumption that $\sigma_x^2 = \sigma_y^2 = 1$.