

## Homework 8

Due Dec 1st, 2022

### Problem 1

Suppose  $X_1, \dots, X_{11}$  are iid  $N(\mu_1, \sigma^2)$  and  $Y_1, \dots, Y_{21}$  are iid  $N(\mu_2, \sigma^2)$ . Suppose we compute  $\bar{X} = 1.1$ ,  $S_X^2 = 1.25$ ,  $\bar{Y} = 1.9$  and  $S_Y^2 = 1.21$ . Construct an EXACT 95% confidence interval for  $\mu_1 - \mu_2$ .

### Problem 2

Among 1000 random selected voters 450 say they will vote for candidate A. Could you provide a 95% confidence interval for the true supporting rate of candidate A? Does your confidence interval cover 0.5?

### Problem 3

$X_1, \dots, X_m \stackrel{iid}{\sim} N(a, \sigma_1^2)$ ,  $Y_1, \dots, Y_n \stackrel{iid}{\sim} N(b, \sigma_2^2)$ . Suppose  $\sigma_2^2/\sigma_1^2 = \lambda$  and  $\lambda$  is known, find a  $1 - \alpha$  confidence interval for  $b - a$ .

### Problem 4

Suppose  $X_1, \dots, X_n$  are iid  $N(\mu, 16)$ , if we want to construct a  $1 - \alpha$  level confidence interval for  $\mu$  with length less than  $L$ . How large must  $n$  be?