# MATH 282B – Homework 1

**Problem 1.** Write a function $\mathsf{confBand(x, y, conf = 0.95)}$ taking in a predictor vector $(x_1, \ldots, x_n)$ and a response vector $y = (y_1, \ldots, y_n)$ and returning a plot with the points $(x_1, y_1), \ldots, (x_n, y_n)$, the least squares line, and the confidence band at level $\mathsf{conf}$. Apply your function to variables in the dataset used in lecture.

**Problem 2.** Let $n = 100$ and draw $x_1, \ldots, x_n \overset{\text{iid}}{\sim} \mathrm{Unif}(0, 1)$, which stay fixed in what follows. Repeat the following experiment $N = 1000$ times.

- Generate $y_i = 1 + x_i + \varepsilon_i$, with $\varepsilon_i$ i.i.d. $\mathcal{N}(0, 0.2)$.
- Compute the 99% confidence band and record whether it contains the true line, or not.

Summarize the result of this numerical experiment by returning the proportion of times (out of $N$) that the confidence band contained the true line.