MATH 185 – Homework 4
Due Wednesday, 05/09, by 11:59 PM

Send your code here. For Homework 1, write "MATH 185 - HW 1" *in subject line and nothing else in the body. There should only be one file attached, with the name* hw1-lastname-firstname.R. *Make sure your code is clean, commented and running. Keep your code simple, using packages only if really necessary. If your code does not run, include an explanation of what is going on.*

Problem 1. Propose and write a function (called locationScaleGOF) which takes in two (unpaired) samples to test whether the underlying distributions are location/scale transformations of each other. As a comment, explain in a couple of sentences the basic idea.

Problem 2. The function t.test implements the t-test for comparing the means of two normal samples. We here perform some simulations to compare this parametric test with the rank-sum test, which is nonparametric. They are both applicable in a shift model where $X \sim \mu + Y$, where $\mu \geq 0$ is the shift, and we are testing $\mu = 0$ versus $\mu > 0$.

A. Assume the samples are both normal, with respective distributions $\mathcal{N}(\mu, 1)$ and $\mathcal{N}(0, 1)$. The sample sizes are the same, equal to $n \in \{10, 20, 50, 200\}$. For each n, choose a range of μ to compare the two tests. Set the level at 10%. Use a number of repeats equal to $B = 200$. The result for each n should be two curves (optionally with error bands), one for each test, tracing the fraction of rejections plotted versus μ.

B. Repeat, now assuming that both samples are from the Cauchy distribution with median μ and 0, respectively.

Problem 3. Find a package that implements the two-sample Cramer - von Mises test. Then apply it to the calcium data from the Journal of Statistics Education.[1] (The dataset is available in the file `calciumgood.dat.txt` while the description is in the file `calcium.txt`.) Specifically, compare the calcium levels of men compared to women.

[1] http://ww2.amstat.org/publications/jse/jse_data_archive.htm