Stat 651 Statistical Theory I, Fall 2022
Homework 1, due Friday, September 2.

Please answer the following questions and submit them through Gradescope. Your answers must be handwritten, not typed. (In particular, I'm checking to see whether you are able to use Gradescope correctly and getting the problem numbers to match up inside Gradescope.) It's okay to typeset later homework assignments if you prefer.

1. (a) Name and student ID (please print): _____

   (b) Signature: _____

   (c) Do you have any special needs or concerns regarding this class that I should know about? If so, please explain.

   (d) Do you have any special concerns or issues you'd like to see addressed this semester (course content or how class is conducted)? If so, please explain.

   (e) What are you primary interests? Why Bayesian statistics? Are there particular topics you'd like to see discussed in this course?

   (f) Do you have a copy of the Casella/Berger text? If not, when do you expect it to arrive?

   (g) Have you used Gradescope for submitting homework electronically?

   (h) Do you have access to a printer? (This may not be necessary, so no worries if not.)

   (i) We will be doing a small amount of computer work during the course of the semester, sometimes to verify our answers, sometimes to simulate some data sets to get an idea whether a method we've discussed is plausibly correct. We'll use R for this, and I'll introduce as much of it as we need along the way. To give me an idea what type of computer background students in this class have, would you please describe your computing experience, e.g. software packages you've worked with, languages you've written in, etc, including R? Estimate how much time you've spent at each, e.g. 1 hour, 10 hours, 100 hours, 1000 hours, etc.

   (j) Any questions up front?

2. (a) Monty Hall problem: On a game show, the contestant sees three doors; behind two of the doors, there's a goat; behind the third door, there's a car. Once you select a door, say door #1, Monty Hall then shows you that there's a goat behind one of the other doors, say door #2, and he asks you whether you'd like to switch your choice to the 3rd door. Does it matter if you switch doors when you're given the chance? What should you do, switch or stay with your original choice?

   Circle one: SWITCH DON'T SWITCH DOESN'T MATTER

   (By the way, this is a probability question, not statistics.)

   (b) Use R to simulate the following; state the values it generates. (Please ask me if you haven't used R before. It takes (maybe) 10 minutes to install R (for free!), and less than two minutes to run the R code below.)

      i. Five draws from the set { 1,2,3,...,10 } with replacement. R code:
      `sample( 1:10, 5, replace=TRUE )`

      ii. Five independent draws from a normal distribution with mean 1.0 and standard deviation 0.5. R code:
      `rnorm( 5, mean=1.0, sd=0.5 )`

   (c) Evaluate the following integrals, by hand and and also using Wolfram Alpha. (Please ask me if you are unfamiliar with Wolfram Alpha. It's free; use duckduckgo to find it.)

$$I_1 = \int_0^1 x^2 dx =$$

$$I_2 = \int_0^1 \int_0^{2y} x \, dx \, dy =$$

   Please sketch the region that I_2 corresponds to. (This is a Calculus III question, and Calc III is a prerequisite for this course; you may need a refresher on this when we evaluate these types of integrals halfway through the semester. Ask me if you have concerns about this.)