

## DATA130004: Homework 4

Due in class on October 31, 2018

1. Rizzo book Exercise 5.6, 5.7, 5.9 and 5.10.
2. Monte Carlo method can be used to approximate the fraction of a  $d$ -dimensional hypersphere which lies in the inscribed  $d$ -dimensional hypercube. Simulate with different dimensions  $d = 2, 3, 4, \dots, 10$ . (Hint: use `apply` function.)
  - (1) Derive the formula for the EXACT values for the above problem for each  $d$ -dimension.
  - (2) Using the above formula, approximate the value of  $\pi$ . Find the number of points needed to approximate  $\pi$  to its 4-th digit for each dimension  $d$ . Set the random seed with `set.seed(123)` at the beginning of your R code.