Assignment 2: 20 points

- 1. [5 points] Consider the Monty Hall problem with four doors. One of the doors has a car behind it and the other three have goats. The car is equally likely to be behind any of the four doors. A contestant picks a door at random. The game show host then reveals one of the other doors which do not have the car. If the contestant always switches from his currently chosen door to one of the two doors which are not open, what is the probability that he wins the car? Assume that both the host and contestant choose randomly when faced with multiple choices for doors.
- 2. [5 points] Let $F : \mathbb{R} \mapsto [0, 1]$ be the distribution function a random variable X. Prove that F is right continuous, i.e. $F(x+h) \to F(x)$ as $h \downarrow 0$.
- 3. [5 points] F is **not always** left continuous i.e. it is not always true that $F(x+h) \not\rightarrow F(x)$ as $h \uparrow 0$.
- 4. [5 points] $P(X = x) = F(x) \lim_{y \uparrow x} F(y)$.

For questions 2, 3, and 4, some of the definitions given in https://www.ee.iitb.ac.in/~sarva/courses/EE325/2015/Assignments/assignment2.pdf are relevant.