Mathematical Skills for Data Scientists
Lab Exercises 6 – 4 Marks (Due: 28/11/22)

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The Monty Hall game: There are three doors. Two doors have a goat behind them. The other door has a new car behind it. You choose a door. The game host, Monty, who knows what is behind each door, opens one of the two doors which you did not choose, revealing a goat. If both doors had goats behind them, Monty chooses between the two with equal likelihood. Monty invites you to change your initial decision. What should you do? Switch, or stick with your first choice? (**Important**: Your goal is to win a car, not a goat.)

Exercise 1 (MATLAB)**.** What is the best choice in the Monty Hall game? Implement the Monty Hall game in MATLAB and experimentally verify your answer. Simulate the game for atleast 1000 times and calculate the probability of winning if player sticks to initial choice and if player change his initial choice (marks 2)

Exercise 2 (Excel)**.** [**Example**]**You are betting on coin tosses, and at the start believe that there is a 1 in 10 chance of your opponent using a coin with two heads. Calculate how likely you should consider your opponent cheating after seeing 3 subsequent heads. (no marks)**

Exercise 3 (Excel)**.** Consider the setting of Exercise 2, but start with an initial probability of cheating of $\frac{1}{1.000.00}$. Show how the probability assigned to cheating vary as the number of subsequent heads increases. When is the threshold of 50% exceeded? When the threshold of 99.9%? (marks 2)