Homework 4: SVM **CSCE 633**
Due: 11:59pm on Jul 2, 2024

Instructions for homework submission
a) For each question, please explain your thought process, results, and observations in a markdown cell after the code cells. Please do not just include your code without justification.
b) **You can use any available libraries for this homework.**

Question 1: SVM

In this problem, we will use university application data for the purpose of admission classification. The data can be downloaded from this link.

(a) **Data Pre-processing:** Create a binary label based on the column "*Chance of Admit*". Convert any values bigger than the mean to 1 and 0 otherwise.

(b) **Model Initialization:** Initialize 4 different SVM models with the following kernels.

1. Linear kernel
2. RBF kernel
3. Polynomial (degree 3) kernel

(c) **Feature Selection and Model Training:** Train each SVM Model above with the following feature combinations to predict admission.

1. CGPA and SOP
2. CGPA and GRE Score
3. SOP and LOR
4. LOR and GRE Score

(d) **Result Visualization:** Visualize the decision boundary for each model and for each input combination.

(e) **Result Analysis:** Just by looking at the figures you generated before, answer this question: Which of the feature + kernel combinations gave you the best result?

(f) **Result Post-processing:** Were there any outliers in the data? If yes, please explain how we can use a one-class SVM to detect them. (No need for code implementation)