CSE475 HW3, Tuesday, 04/01/2025, Due: Monday, 04/14/2025

1. Please note that you have to typeset your assignment using either LATEX or Microsoft Word for Problem 1. If you have difficulty typing mathematical equations or symbols, you can take photos of handwritten answers and then insert the photos to the file. Only legible handwritten answers will be accepted and graded. You need to produce an electronic version (in PDF form) for Problem 1, and name the PDF file "CSE475-HW3-LastName-FirstName.pdf". Please name your code file for Problem 2 "CSE475-HW3-P2-LastName-FirstName.ipynb". Please put the PDF file and the code file to a zipped file named CSE475-HW3-LastName-FirstName, and submit the zipped file to Canvas.

2. If you have any questions on the homework problems, you should post your question on the Canvas discussion board (under HW3 Q&A), instead of sending emails to the instructor or TA. We will answer your questions there. In this way, we can avoid repeated questions, and help the entire class stay on the same page whenever any clarification/correction is made.

1. [10pts] We are given the following data set, which contains 13 samples, each representing a restaurant with different values for 5 features of interest ("Food", "Cuisine", "Service", "Ambience", and "Cost"). Each restaurant is also labeled by "Good" or "Bad" in terms of customer experience.

Samples	Food Rating	Cuisine	Service	Ambience	Cost	**Overall Experience**
1	4 stars	American	Needs Improvement	Fine Dining	$	Good
2	5 stars	Mexican	Decent	Café	$	Good
3	4 stars	Italian	Decent	Fine Dining	$$	Good
4	4 stars	American	Good	Roof Top	$$	Good
5	4 stars	American	Good	Roof Top	$	Good
6	5 stars	Mexican	Decent	Café	$	Good
7	4 stars	Mexican	Decent	Café	$$$	Bad
8	5 stars	Mexican	Decent	Café	$	Good
9	5 stars	Mexican	Decent	Café	$	Good
10	3 stars	American	Decent	Roof Top	$	Bad
11	4 stars	Italian	Needs Improvement	Fine Dining	$$$	Good
12	3 stars	American	Good	Roof Top	$	Bad
13	4 stars	American	Needs Improvement	Roof Top	$$	Bad

(1) Using the given data set, we will learn a decision tree for predicting the overall experience of a restaurant based on its 5 features (note that the splitting process terminates when the node

is pure). Solve this problem and plot the final decision tree. Please show how to decide the feature for each node by information gain, and the corresponding partition of the training data at each node (except for the leaf nodes) using the selected feature at that node.
(2) Use the decision tree built in step (1) to classify the following restaurants (test samples A, B, and C), predicting their respective overall experience labels.

Test Samples	Food Rating	Cuisine	Service	Ambience	Cost	**Overall Experience**
A	3 stars	American	Good	Roof Top	$$$	?
B	4 stars	Italian	Decent	Fine Dining	$$	?
C	3 stars	Italian	Decent	Fine Dining	$$	?

2. [10pts] Please refer to “HW3.ipynb”.