Note: All coding problems are to be implemented in a single jupyter notebook.
Note: this is the distribution of questions:

(a) Question 1 to Question6: Required for everyone.

(b) Question 7 - Question 8: Required only for Graduate Students

(c) Question 9- Question 10: Bonus marks

——————————— Bonus for undergraduates beyond this line

Problem 1 (5 points)

We studies Automatic Differentiation in class. Consider the following function:

$$f(x, y, z) = \frac{1}{3}(x_1 x_2 \sin(x_3) + exp^{x_1 x_2}) \tag{1}$$

(a) Draw the computation graph for this equation.

(b) List the detailed computation steps for forward and backward mode of AD. Provide your answers the same way we did in class, by using notations like:

$$v_{-2}, v_{-1}, v_0, v_1, v_2 \tag{2}$$

to get you started:

$$v_{-2} = 1, \dot{v}_{-2} = \frac{\partial v_{-2}}{\partial x_{-2}} = 0 \tag{3}$$

Provide all the steps like this and values for other nodes in computation graph.

Problem 2 (5 points)

Select the correct option.Accuracy is probably the most commonly used metric in the most common type of Deep learning problems:

(a) Accuracy is very easy to interpret and is aligned on what you want to measure.

(b) Accuracy is differential and can be used to directly in gradient based optimisation process

(c) We want accuracy to count every error as equal.

(d) If the number of sample is similar, we cannot make any mistake on the less populated category.

Problem 3 (5 points)

You are working as a Machine Learning Engineer in Metflix Inc. You are building a model to classify users who watch a lot of movies in Ultiverse. What metrics will you choose to evaluate your model?

Problem 4 (5 points)

You are working as a Machine Learning Engineer in Metflix Inc. You are building a model to classify users who watch a lot of movies in Ultiverse. What metrics will you choose to evaluate your model?

Problem 5 (5 points)

Which method is used involved in numerical optimization of an appropriate selection of model criterion? How do you define the error of such estimator?