AI4ICPS IIT Kharagpur	**IIT KHARAGPUR AI4ICPS I HUB FOUNDATION** **H**ands-on **A**pproach to **AI, Cohort-2, July – October 2024** **Additional Descriptive Assignment 1: Supervised Learning**

Due date: Saturday 26th October 2024, EOD – IST.

Important Instructions for submitting solutions

1. Submit the solution to all questions in the assignment should be submitted in a **single PDF file with not more than 500 words**.
2. Any plagiarism if detected will automatically attract **zero marks** for that assignment.
3. It is preferable if the **text of PDF file can be extracted** through a PDF extractor e.g. PyPDF. For example, pictures of handwritten text are not extractable, whereas PDF generated by MS Word, Latex, etc., are.
4. Exceptionally good solutions with extractable text may receive **special appreciation** from the teachers.

a) Consider Linear Regression, Support Vector Machines (SVM), k-Nearest Neighbors (k-NN) and Decision Trees. For each models, write two strengths and limitations, and a suitable application scenario where you would apply one of them but not others.

b) Explain the bias-variance tradeoff in the context of supervised learning, with following points in mind:
   - Definition of bias and variance.
   - How these concepts influence model performance.
   - The impact of model complexity on bias and variance.
   - Strategies to balance bias and variance when training a model.