Indian Institute of Technology Jodhpur
CSL2010: Introduction to Machine Learning
Lab 5, Due Date: Sep 14 , 2025, Max Marks: 35+15 for Viva

1. (35 points) Consider the attached dataset $\{\mathsf{x}_i, y_i\}_{i=1}^n$ where each data point $\mathsf{x}_i \in \mathbb{R}^2$ has features and the corresponding label $y_i \in \{-1, 1\}$ is a binary variable. Partition the dataset into training (80%) and validation (20%) sets. Now, do the following.
   (a) Implement the Support Vector Machine algorithm to find the linear classifier with maximum possible margin between the two classes. Use the training dataset to find the optimal parameters. Find the training and validation accuracy.
   (b) Plot the fitted linear boundary, the margin lines and the support vectors. Also overlay the test and validation data points (with different colors) on this plot.