Problem Set 1

1. **Supervised versus Unsupervised Learning [5 points]:** In your own words, define each learning approach and describe the difference between these approaches.

2. **Supervised Learning: Regression versus Classification [5 points]:** In your own words, define each learning problem and describe the difference between them.

3. **Supervised Learning: Generalization [5 points]:**

   (a) Describe the motivation for splitting data into a training dataset and testing dataset.

   (b) If your model performs well on the training data and generalizes poorly to new instances, is the model overfitting or underfitting?

   (c) If your model performs poorly on the training data and poorly on new instances, is the model overfitting or underfitting?

   (d) Describe the motivation for regularizing a model.

4. **Instance-Based versus Model-Based Learning [5 points]:** In your own words, define each learning approach and describe the difference between them.

5. **Offline versus Online Learning [5 points]:** In your own words, define each learning approach and describe the difference between them.