Lecture 12 Outline:

Textbook Reading: ISL Chapter 9 or ESL Chapter 4.5 and 12.2.

1. Review: Optimal Separating Hyperplanes and Linear SVM.

2. Linear SVM as a loss function + penalty.
   - Hinge loss.
   - Regularized extensions.
     - Sparse SVM.
   - Comparisons to other classification loss functions.

3. Multi-Class SVMs.
   - One vs. One
   - One vs. All

4. The SVM Dual.
   - Derivation of the SVM dual optimization problem.
   - KKT conditions.
   - Interpretations:
     - Support vectors.
     - Margins.
     - Slack variables.
     - Sparsity in the sample space.

5. Real data example.

   - $\epsilon$-insensitive loss function.
   - Interpretations.
   - Comparisons to other regression types and loss functions.

7. Strengths and Weaknesses of SVMs.