

ECE 492-45 Homework 8

Material Covered: Cross-Validation, Bootstrap

Problem 1 (20 points) [Validation set approach] Complete ISLR-5.4.5.

Problem 2 (20 points) [Leave-one-out cross-validation] Complete ISLR-5.4.7.

Problem 3 (20 points) [Overlap between original sample and bootstrap sample] Complete ISLR-5.4.2. Use the result in (c), show that a bootstrap sample on average contains $n(1 - (1 - 1/n)^n)$ points from the original sample of size n . (Hint: Consider it as a coin tossing problem.)

Problem 4 (20 points) [Bootstrap commands in R] Complete ISLR-5.3.4.

Problem 5 (20 points) [Bootstrap application] Complete ISLR-5.4.9. For (b), prove that $\text{Var}(\hat{\mu}) = \sigma_X^2/n$, where $\hat{\mu} = (X_1 + \cdots + X_n)/n$.