

ECE 492-45 Homework 9 (Fall 2021)
Instructor: Dr. Chau-Wai Wong
Material Covered: Cross Validation, Bootstrap

Problem 1 (20 points) [Cross-Validation] Complete ISLR-5.3.1–3.

For Python users, please follow the text book’s instructions while referring to *the “equivalence” Python code of ISLR-5.3.1–3.*

Problem 2 (20 points) [Validation set approach] Complete ISLR-5.4.5.

For Python users, please download *Default.csv data* and follow the text book’s instructions while referring to *the “equivalence” Python code of ISLR-5.4.5.*

Problem 3 (20 points) [Overlap between original sample and bootstrap sample] (Try it after Monday lecture) 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] (Try it after Monday lecture) Complete ISLR-5.3.4.

For Python users, please download *Portfolio.csv data* and follow the text book’s instructions while referring to *the “equivalence” Python code of ISLR-5.3.4.*

Problem 5 (20 points) [Bootstrap application] (Try it after Monday lecture) Complete ISLR-5.4.9.

For (b), prove that $\text{Var}(\hat{\mu}) = \sigma_X^2/n$, where $\hat{\mu} = (X_1 + \dots + X_n)/n$.

For Python users, please download *Boston.csv data* and follow the text book’s instructions while referring to *the “equivalence” Python code of ISLR-5.4.9.*

Problem 6 (ClassEval, bonus 10’.) (Try it on or after 11/16) Have you completed ClassEval? It can be found at:

<http://go.ncsu.edu/cesurvey>

Grading: (a) Yes = 10 points, thank you! Please attach the screenshot of the confirmation page. (b) I promise to do it soon = 2 point for good intentions. (c) No = 0 points, a possibly honest answer, but why not spend 5 minutes and get 10 points?