

ECON 6990
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Problem Set 3
Due date: Mar. 14, 2024

Problem 1. Consider the nonparametric estimator of $p(x)$ for an unordered and ordered discrete variable below:

$$p_n(x) = \frac{1}{n} \sum_{i=1}^n l(X_{i1}^o, x_1^o, \lambda_1^o) L(X_{i1}^u, x_1^u, \lambda_1^u) \quad (1)$$

where $l(X_{i1}^o, x_1^o, \lambda_1^o) = \frac{\lambda_{x_1^o}^{d_{x_1^o}}}{\Lambda_i}$ and $L(X_{i1}^u, x_1^u, \lambda_1^u) = (1 - \lambda_1^u)^{I(X_{i1}^u = x_1^u)} (\lambda_1^u / (c - 1))^{1 - I(X_{i1}^u = x_1^u)}$.

- a. Write a script file that takes as inputs $X_{i1}^o, x_1^o, \lambda_1^o$ and $X_{i1}^u, x_1^u, \lambda_1^u$ that estimates a bivariate probability function. Call this file *udens2d.R*.
- b. Using the data set *wagesub.csv* estimate the joint probability function across the support values for education (ordered) and the state (unordered) indicator variable. Note the value of λ^u and λ^o that you use in your estimation.
- c. Plot the joint probability function and compute the 95% confidence intervals.