

Problem Set: Logistic Regression

1. Suppose we have a set of data $(z_1, y_1), \dots, (z_5, y_5)$ as follows:
 $z_1 = (1, 2), z_2 = (2, 1), z_3 = (2, 3), z_4 = (3, 2), z_5 = (1, 1)$ with
 $y_1 = y_2 = k_0 = 0$ and $y_3 = y_4 = y_5 = k_1 = 1$.

Apply logistic regression by doing the following:

- a) Find the log-likelihood function $L(\beta)$.
- b) Apply iterative reweighted least squares to find estimates for $\beta_0, \beta_1, \beta_2$.
- c) Find the estimated probability function $\hat{p}(x)$, where $p(x) = \Pr(Y = 1|X = x)$.
- d) Classify the new point $x = (1.5, 1)$ using $\hat{p}(x)$.