(Nonparametric) Logistic Regression

- Goal: approximate $\log \frac{\Pr(Y=1 \mid X=x)}{\Pr(Y=0 \mid X=x)} = f(x)$
- f(x) replaces log p(x) in the log-likelihood of the data
- Parameters in f(x) are set so as to maximize log-likelihood

Nonparametric Logistic Regression

- Parametric:
  - $p(x) = p(Y=1 \mid X=x) = \beta^T x$ in log-likelihood
- Nonparametric:
  - $p(x) = p(Y=1 \mid X=x) = \sum_{j=1}^{N} N_j(x)\theta_j$ in log-likelihood
- Nonparametric regression adds a penalization term to the log-likelihood being minimized $-\frac{1}{2}\int \{f''(t)\}^2$

Nonparametric Logistic Regression

- Parameters estimated by iterating
  - plr: formula for β (p. 99, 4.26)
  - nplr: formulae for θ and f (p. 138, 5.33, 5.34)
- Scope for plugging other nonparametric regression operator in $f^{new} = S_{\lambda,w} z$