**Supplemental written problems due Wednesday, January 14, 2004 at the beginning of class.**

1. Let $Y_i$, $i = 1, \ldots, n$ be independent Bernoulli random variables with $Y_i \sim \mathcal{B}(1, p_i)$ where

$$\text{logit}(p_i) = \log\left(\frac{p_i}{1 - p_i}\right) = \beta_0 + \beta_1 x_i$$

and $x_i$, $i = 1, \ldots, n$ are known covariates. Write down the likelihood, log likelihood, score, and Fisher's information for $\vec{\theta} = (\beta_0, \beta_1)^T \in \Theta \subset \mathcal{R}^2$. (Note: There is no closed form solution for the maximum likelihood estimates in this logistic regression problem. I would encourage you to express your answers in terms of the $p_i$'s, where appropriate. I expect you will find that the chain rule is your friend.)