TMA4315: Project 1

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Problem 1

a)

Since the response variables $y_i \sim \text{Bernoulli}(p)$, the conditional mean is given by $\text{E}y_i = p$, which is connected to the covariates via the following relationship:

$$x_i^T \beta =: \eta_i = \Phi^{-1}(p),$$

which implies that $p = \Phi(\eta_i)$.This results in the likelihood function

$$\begin{aligned} L(\beta) &= \Pi_{i=1}^n p^{y_i}(1-p)^{1-y_i} \\ &= \Pi_{i=1}^n \Phi(\eta_i)^{y_i}(1-\Phi(\eta_i))^{1-y_i} \end{aligned}$$