$$P(Y_i \leq 1) = P_1$$

$$P(Y_i \leq 2) = P_1 + P_2$$

$$P(Y_i \leq 3) = P_1 + P_2 + P_3 = 1$$

Now, $\text{logit}(P_1) = \beta_{01} + \beta_{11} \times x_{i1}$

$\text{logit}(P_1 + P_2) = \beta_{02} + \beta_{12} \times x_{i1}$

$$\log\left(\frac{P_1}{\quad}\right) = e^{\beta_{01} + \beta_{11} \times x_{i1}}$$

$$\log(P_1 + P_2) = \beta_{02} + \beta_{12} \times x_{i1}$$

$$P_1 = \frac{\exp(\beta_{01} + \beta_{11} \times x_{i1})}{1 + \exp(\beta_{01} + \beta_{11} \times x_{i1})}$$

$$P_2 = \frac{\exp(\beta_{02} + \beta_{12} \times x_{i1})}{1 + \exp(\beta_{02} + \beta_{12} \times x_{i1})} - \frac{e^{(\beta_{01} + \beta_{11} \times x_{i1})}}{1 + \exp(\beta_{01} + \beta_{11} \times x_{i1})}$$

Now, $P_3 = 1 - P_1 - P_2$