1) a) $p(y_{i2}=1 \mid y_{i1}=0, x_{i1}, x_{i2}, \alpha_i) = p(y_{i2}=1 \mid x_{i1}, x_{i2}, \alpha_i) = \Lambda(\alpha_i + x_{it}'B_0)$

b) $1-\Lambda(\alpha_i + x_{it}'B_0)$

c) note $$p(y_{i2}=1 \mid y_{i1} \neq y_{i2}, x_{i1}, x_{i2}, \alpha_i) = \frac{p(y_{i2}=1,\ y_{i1}\neq y_{i2} \mid x_{i1}, x_{i2}, \alpha_i)}{p(y_{i1}\neq y_{i2} \mid x_{i1}, x_{i2}, \alpha_i)}$$

$$= \frac{p(y_{i2}=1,\ y_{i1}=0 \mid x_{i1}, x_{i2}, \alpha_i)}{p(y_{i2}=1, y_{i1}=0 \mid x_{i1}, x_{i2}, \alpha_i) + p(y_{i2}=0, y_{i1}=1 \mid x_{i1}, x_{i2}, \alpha_i)}$$

$$= \frac{\dfrac{1}{1+e^{-\alpha_i - x_{i2}'B_0}}\ \dfrac{e^{-\alpha_i - x_{i1}'B_0}}{1+e^{-\alpha_i - x_{i1}'B_0}}}{\dfrac{1}{1+e^{-\alpha_i - x_{i2}'B_0}}\ \dfrac{e^{-\alpha_i - x_{i1}'B_0}}{1+e^{-\alpha_i - x_{i1}'B_0}} + \dfrac{1}{1+e^{-\alpha_i - x_{i1}'B_0}}\ \dfrac{e^{-(\alpha_i - x_{i2}'B_0)}}{1+e^{-\alpha_i - x_{i2}'B_0}}}$$

$$= \frac{e^{-\alpha_i - x_{i1}'B_0}}{e^{-\alpha_i - x_{i1}'B_0} + e^{-\alpha_i - x_{i2}'B_0}} = \underbrace{\frac{e^{-x_{i1}'B_0}}{e^{-x_{i1}'B_0} + e^{-x_{i2}'B}}}_{\text{does } \underline{\underline{\text{not}}} \text{ depend on } \alpha_i}$$

Similarly can get $p(y_{i1}=1 \mid y_{i1} \neq y_{i2}, x_{i1}, x_{i2}, \alpha_i)$

So we have probability function for each i, conditional on $y_{i1} \neq y_{i2}$, and can do MLE for those who "switch" over time

3) $\frac{1}{n} \sum d_i \log \frac{1}{\sigma} \phi\left(\frac{y_i - x_i'\beta}{\sigma}\right) + (1-d_i)\, \Phi\left(\frac{k_i - x_i'\beta}{\sigma}\right)$

same in both cases, a) and b)