$$\log\left(\mathcal{L}(\beta)\right) = \log\left(\prod_{i}^{n} \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(y_i - x_i\beta)^2}{2\sigma^2}}\right) = \sum_{i}^{n} \log\left(\frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(y_i - x_i\beta)^2}{2\sigma^2}}\right)$$