1) c Probabilistic Interpretation in slide 11:

$$L(w) = \left(\frac{1}{\sqrt{2\pi}\,\sigma}\right)^N \exp\left(- \frac{\sum_{n=1}^N (y_n - w^t x_n)^2}{2\sigma^2}\right)$$

1. First Step: Let's assume we have bias.

$$L(w) = \left(\frac{1}{\sqrt{2\pi}\,\sigma}\right)^N \exp\left(- \frac{\sum_{n=1}^N (y_n - w_0 - w^T x_n)^2}{2\sigma^2}\right)$$

2. Apply log:

$$\ell(w) = \frac{1}{2\sigma^2} \sum_{n=1}^N (y_n - w_0 - w^T x_n)^2 - N\left(\frac{1}{2}\log\sigma^2 - \log\sqrt{2\pi}\right) =$$

$$= \left\{\frac{1}{2\sigma^2} \sum_{n=1}^N (y_n - w_0 - w^T x_n)^2 - \frac{N}{2}\log\sigma^2\right\} - \underbrace{\log\sqrt{2\pi}}_{\text{constant term!}}$$

$$= \frac{1}{2}\left(\frac{1}{\sigma^2}\sum_{n=1}^N (y_n - w_0 - w^T x_n)^2 - N\log\sigma^2\right) + \text{constant}.$$

$$= \frac{1}{2}\left(\sum_{n=1}^N \underbrace{\frac{1}{\sigma^2}}_{= c_n} (y_n - w_0 - w^T x_n) - N\log\sigma^2\right) + \text{constant}$$

$= c_n$, this means that the cost may vary according to N size (we can check the term $\boxed{N\log\sigma^2}$).

Also, if N size varies, one may expect that sigma also varies, thus, influencing the error function.