3 $y_i = wx_i + \varepsilon_i$, $\varepsilon_i = N(0,1)$

$\underset{w}{\arg\max} \log P(D|w) \overset{?}{=} \underset{w}{\arg\min} \sum_{i=1}^{n} (y_i - wx_i)^2$

ε_i has Normal distribution with mean 0 and std 1.
The pdf of ε_i can be written as following:

$\frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2} \Rightarrow pdf(\varepsilon_i) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}\varepsilon^2} \Rightarrow P(y_i|x_i,w) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}(y_i - x_i w)^2}$

$N(0,1)$

$\overset{i.i.d}{\Longrightarrow} P(D|w) = \prod_{i=1}^{n} P(y_i|x_i,w) = \prod_{i=1}^{n} \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}(y_i - x_i w)^2}$

$\Rightarrow \log P(D|w) = \sum_{i=1}^{n} \log P(y_i|x_i,w) = \sum_{i=1}^{n} \log \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}(y_i - x_i w)^2}$

$\Rightarrow \log P(D|w) = \sum_{i=1}^{n} \log \frac{1}{\sqrt{2\pi}} + \log e^{-\frac{1}{2}(y_i - x_i w)^2}$

$= \sum_{i=1}^{n} \log \frac{1}{\sqrt{2\pi}} - \frac{1}{2}(y_i - x_i w)^2$

$\Rightarrow \arg\max \log P(D|w) = \arg\max \left(\sum_{i=1}^{n} \log \frac{1}{\sqrt{2\pi}} - \frac{1}{2}(y_i - x_i w)^2 \right)$

$\xrightarrow{\log \frac{1}{\sqrt{2\pi}} = \text{const}} \arg\max \log P(D|w) = \arg\max \left(\sum_{i=1}^{n} -\frac{1}{2}(y_i - x_i w)^2 \right)$

$\xrightarrow{\text{we can ignore } 2} = \arg\max \left(-\sum_{i=1}^{n} (y_i - x_i w)^2 \right)$

$= \arg\min \left(\sum_{i=1}^{n} (y_i - x_i w)^2 \right)$

$\Rightarrow \arg\max P(D|w) = \arg\min \sum_{i=1}^{n} (y_i - wx_i)^2$