$\hat{y} = ax + b$

주어진 데이터 : $(1,1), (2,2), (3,3)$

$Y = (ax+b) + \epsilon$

$\Leftrightarrow Y - (ax+b) = \epsilon$

※ $(a-b)^2 = a^2 - 2ab + b^2$

$1 - (a+b) = \epsilon_1$

$2 - (2a+b) = \epsilon_2$

$3 - (3a+b) = \epsilon_3$

$\Sigma\epsilon^2 = (1-(a+b))^2 + (2-(2a+b))^2 + (3-(3a+b))^2$

$= 1 - 2(a+b) + (a+b)^2 + 4 - 4(2a+b) + (2a+b)^2 + 9 - 6(3a+b) + (3a+b)^2$

$1 - 2a - 2b + a^2 + 2ab + b^2 + 4 - 8a - 4b + 4a^2 + 4ab + b^2 + 9 - 18a - 6b + 9a^2 + 6ab + b^2 = 14a^2 - 28a + 3b^2 - 12b + 12ab + 14$

- $f(a,b) = 14a^2 - 28a + 3b^2 - 12b + 12ab + 14$
- $\frac{\partial f}{\partial a} = 28a - 28 + 12b$
- $\frac{\partial f}{\partial b} = 6b - 12 + 12a$

- $28a - 28 + 12b = 0 \Leftrightarrow 28a + 12b = 28$
- $12a - 12 + 6b = 0 \Leftrightarrow 12a + 6b = 12$

$$
\begin{array}{r|l}
 & 28a + 12b = 28 \\
- & 24a + 12b = 24 \\
\hline
 & 4a \quad = 4
\end{array}
$$

$\therefore a = 1, \; b = 0$