4) $y = e^{wx}$ $\quad x \in \mathbb{R}, y \in \mathbb{R}, w \in \mathbb{R}$

$D = \{(x_1, y_1), \dots, (x_n, y_n)\}$

A) $SSR = \sum_{i=1}^{n} (\hat{y}_i - y_i)^2 = \sum_{i=1}^{n} (e^{wx_i} - y_i)^2$

B) $$\frac{\partial (SSR)}{\partial w} = \sum_{i=1}^{n} 2(e^{wx_i} - y_i)(x_i e^{wx_i} - 0)$$

$$\Rightarrow \frac{\partial (SSR)}{\partial w} = 2 \sum_{i=1}^{n} (e^{wx_i} - y_i) x_i e^{wx_i}$$

Gradient descent formula: $w_{t+1} = w_t - \underbrace{\alpha}_{\text{learning rate}} \frac{\partial SSR}{\partial w}$

$$\Rightarrow w_{t+1} = w_t - \alpha \cdot 2 \sum_{i=1}^{n} (e^{w_t x_i} - y_i) x_i e^{w_t x_i}$$

C) $$\frac{\partial (SSR)}{\partial w} = 0 \Rightarrow 2 \sum_{i=1}^{n} (e^{wx_i} - y_i) x_i e^{wx_i} = 0$$

$$\Rightarrow \sum_{i=1}^{n} [e^{2wx_i} x_i - e^{wx_i} y_i x_i] = 0 \Rightarrow \sum_{i=1}^{n} x_i e^{2wx_i} = \sum_{i=1}^{n} x_i y_i e^{wx_i}$$

correct answer = option C (3)