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(1) Ans Option 2 MLE → 0

$$J(w) = \arg\min_w (Y - Xw)^2 + \lambda \|w\|_2^2 \quad \longrightarrow (A)$$

On differentiating (A) & equating with zero

$$2(Y - Xw) + 2\lambda \|w\|_2 = 0$$

$$w(\lambda - X) = -Y$$

$$w = \frac{Y}{(X - \lambda)}$$

for $\lambda = 0$

$$w = \frac{Y}{X} \longrightarrow \text{MLE} \Rightarrow J(w) = \arg\min_w (Y - Xw)^2$$

Substituting in (A)

$$J(w) = \arg\min_w (Y - X)^2 + \lambda \left\| \frac{Y}{X} \right\|_2$$

$$= 0$$

Now, $\lambda = \infty$

$$w = \frac{Y}{X \to \infty} = 0$$