# Ordinal Regression or Ordinal Classification

(done in Quiz I)


→ limiting case with threshold everywhere is **Regression**

$$\mathcal{Y} = \mathbb{R} \;;\; g(x) = \omega^T\varphi(x)$$

→ Square-loss: $l\left((y - g(x))\right) = (y - g(x))^2$

$$\min_{\omega \in \mathbb{R}^n} \frac{1}{m}\sum_{i=1}^{m}\left(y_i - \omega^T\varphi(x_i)\right)^2$$

(Least squares problem)

$$\min_{\omega \in \mathbb{R}^n} \frac{1}{2}\|\omega\|^2 + \frac{C}{m}\sum_{i=1}^{m}\left(y_i - \omega^T\varphi(x_i)\right)^2$$

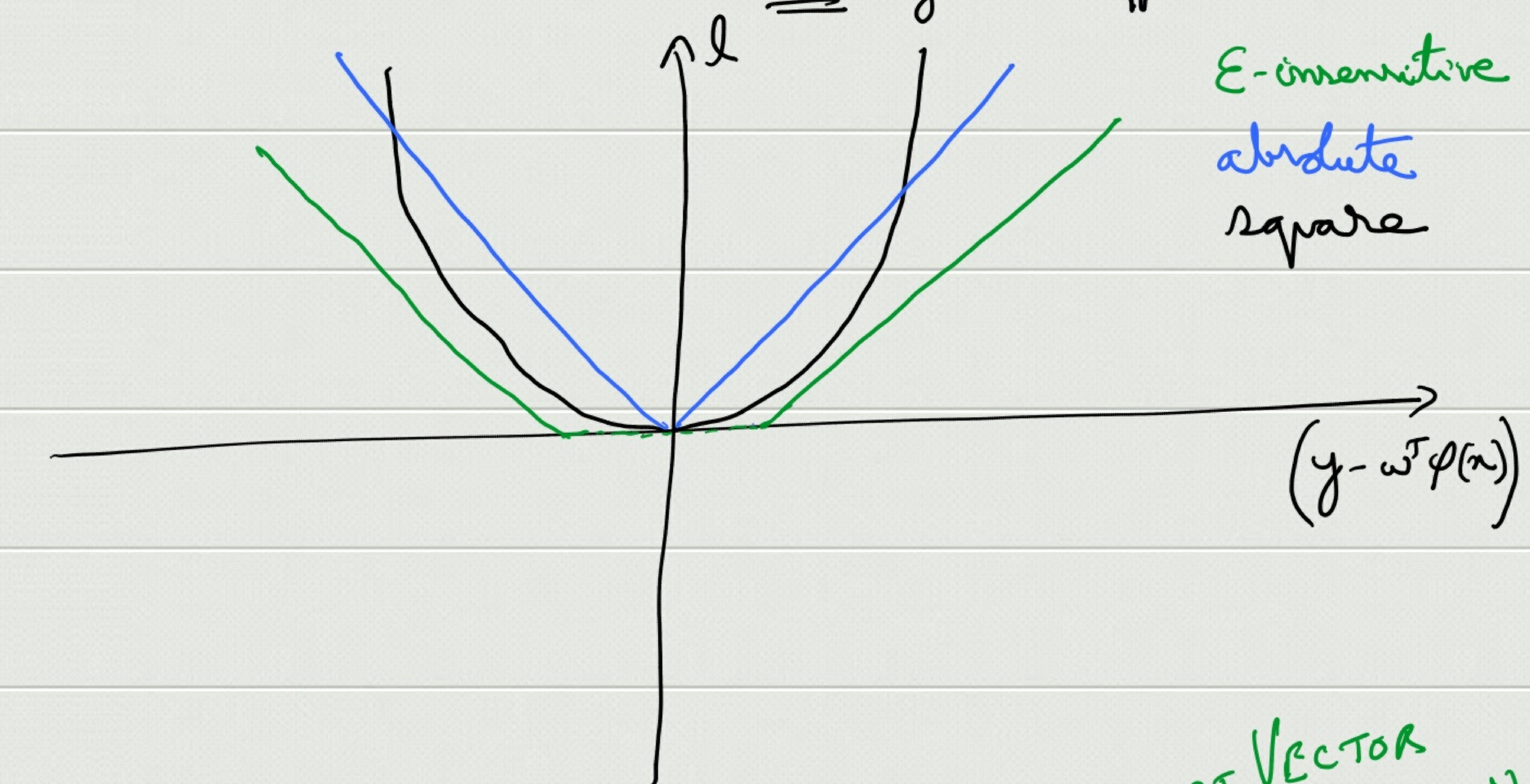
(regularized least squares / Ridge regression)

→ Optimality conditions give:

$$w^* = \underbrace{\left(\frac{mI}{2C} + XX^T\right)^{-1} XY}$$

→ as $C \to \infty$, pseudoinverse of $X^T$.

→ Both the above do <u>not</u> give Support Vector methods




$$l(y - w^T\varphi(x)) = |y - w^T\varphi(x)|$$

$$l(y - w^T\varphi(x)) = \max(0, |y - w^T\varphi(x)| - \varepsilon)$$

→ SUPPORT VECTOR REGRESSION