CS491/691 Quiz 11 Name _____

1. What do the two terms in the following optimization problem mean in English?

$$\min_{\boldsymbol{w},b} \quad \underbrace{\frac{1}{2}||\boldsymbol{w}||^2}_{} \quad \underbrace{+C\sum_n \ell^{(\text{hin})}(y_n, \boldsymbol{w}\cdot\boldsymbol{x}_n + b)}_{} \tag{7.48}$$

2. Given the following $w = (2, 5)$ and $b = -2$, find the slack variables for each of the following samples:
   (a) $x_1 = (-1, 1)$ $y_1 = -1$
   (b) $x_2 = (1, 1)$ $y_2 = 1$
   (c) $x_3 = (-2, 1)$ $y_3 = 1$

$$\min_{\boldsymbol{w},b,\boldsymbol{\xi}} \quad \underbrace{\frac{1}{2}||\boldsymbol{w}||^2}_{\text{large margin}} + \underbrace{C\sum_n \xi_n}_{\text{small slack}}$$

$$\begin{aligned} \text{subj. to} \quad & y_n(\boldsymbol{w}\cdot\boldsymbol{x}_n + b) \geq 1 - \xi_n && (\forall n) \\ & \xi_n \geq 0 && (\forall n) \end{aligned}$$