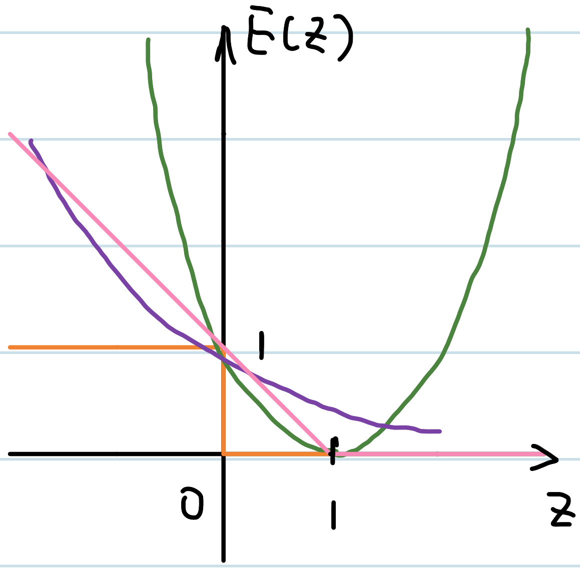
3. Relation between SVM & Logistic Regression



For SVM, the error/risk/miss-classification cost is ξ_n which is defined as $[1 - t_n y_n]_+$. So, it's the pink line

For logistic regression, it's convenient to work with target variable $t \in \{0, 1\}$, but in order to match SVM, we turn it to $\{-1, 1\}$.
Then, according to the definition

$$\sigma(\underbrace{w^T\phi(x)+b}_{y}) = P[t=1 \mid \underbrace{w^T\phi(x)+b}_{=y}]$$

also $1-\sigma(w^T\phi(x)+b) = \sigma(-w^T\phi(x)-b) = P[t=-1 \mid w^T\phi(x)+b]$

To simplify it, we have

$$p(t \mid y) = \sigma(ty)$$

Now, construct an error function

$$\sum_{n=1}^{N} \ln(1+\exp(-yt)) + \lambda \|w\|^2$$

So, the error function is $\ln(1+\exp(-yt))$. If we normalize it to $\log_2(1+\exp(-yt))$, it will pass $(0, 1)$.