LOGISTIC REGRESSION
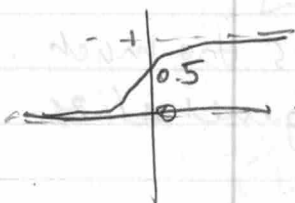
Regression method for predicting well-calibrated probabilities.
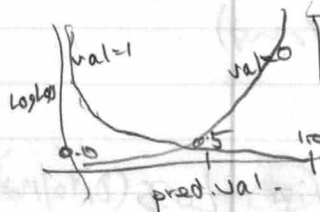
Sigmoid: a function that gives an S-shaped curve bounded between $(0, 1)$

$$y' = \frac{1}{1 + e^{-(w^T x + b)}}$$

$w^T x + b = $ linear model

$\frac{1}{1 + e^{-x}} = $ sigmoid (logistic function)

$$\text{Log Loss} = \sum_{(x,y) \in D} \left[-y \log(y') - (1-y) \log(1-y') \right]$$

<u>Regularization</u> is very important for logistic regression (since the asymptotes are crazy) — prone to overfitting w/out e.g. L2 reg.

(Also: early stopping)

<u>Why?</u> Very efficient! Fast training + prediction.

Differences

| Linear regression | — Predict cont. value |
| Logistic regression | — Predict probability something is true |