# 모두의 딥러닝 (Deep learning)

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# Logistic regression

#### Why logistic regression

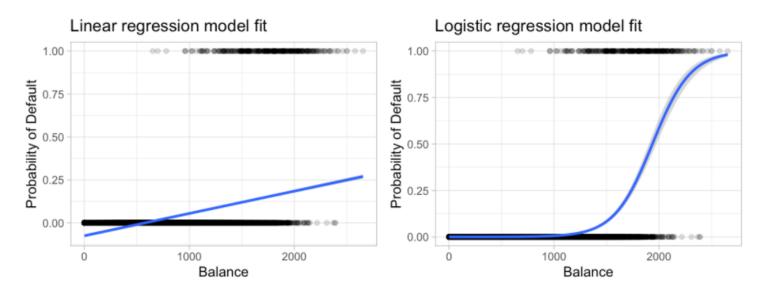
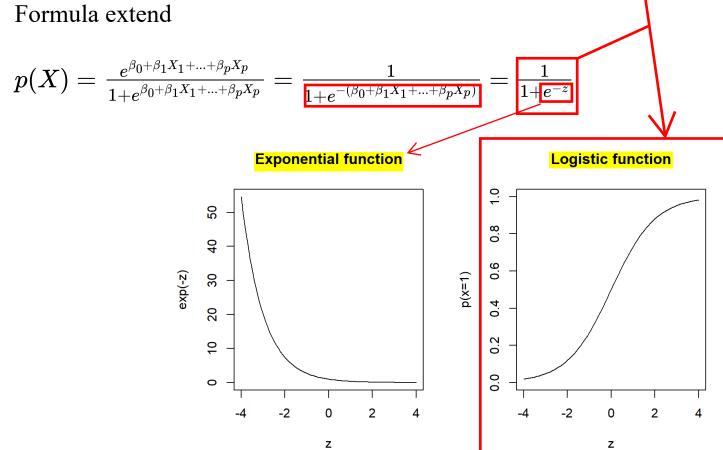


Figure 5.1: Comparing the predicted probabilities of linear regression (left) to logistic regression (right).

Predicted probabilities using linear regression results in flawed logic whereas predicted values from logistic regression will always lie between 0 and 1.

https://bradleyboehmke.github.io/HOML

# 그모이드 (Sigmoid function)



### **Logit transformation**

$$g(X) = ln[rac{p(x)}{1-p(x)}] = eta_0 + eta_1 X + \ldots + eta_p X_p$$

#### Loss function of logistic regression

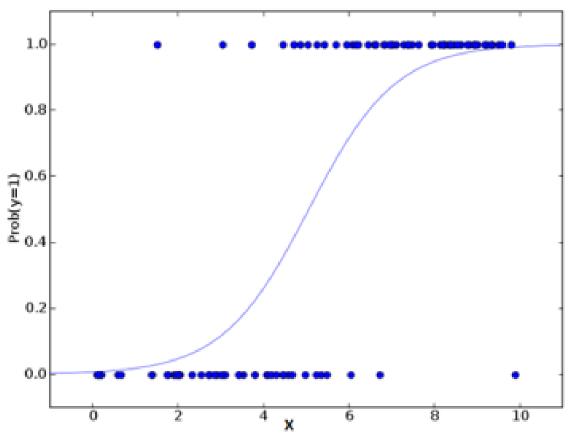
Let's see the cases of loss function of logistic regression This equation does not have a closed-form solution

0 또는 1의 값을 가지며 암일 경우 악성, 양성의 판단을 신용의 경우 불량자인지 아닌지 결정

$$J( heta)=-rac{1}{m}\sum_{i=1}^m [y_ilog(h_ heta(x_i))+(1-y_i)log(1-h_ heta(x_i))]$$
where,  $h_ heta(x_i)=rac{1}{1+e^{- heta x}},~~y\in 0,1$ 

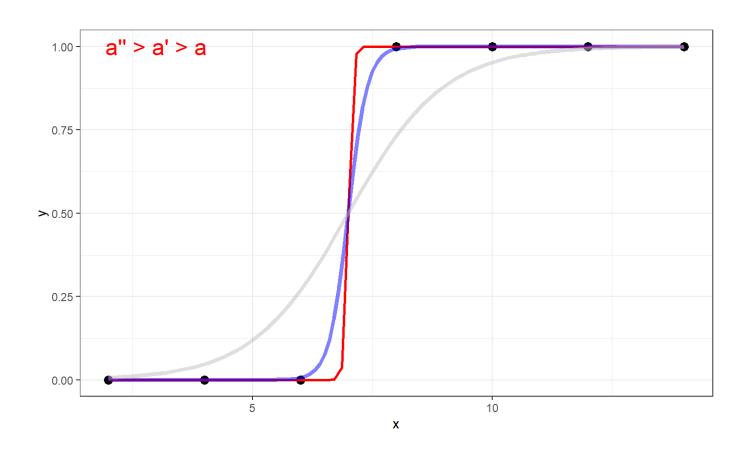
다시 말해, y\_i의 값이 0 또는 1로 값이 결정되는 순간 J에 대입되면 악성(1)일 경우 악성의 확률을 양성(0)일 경우 악성이 아닐 경우의 확률을 나타낸다.

# Logistic estimation

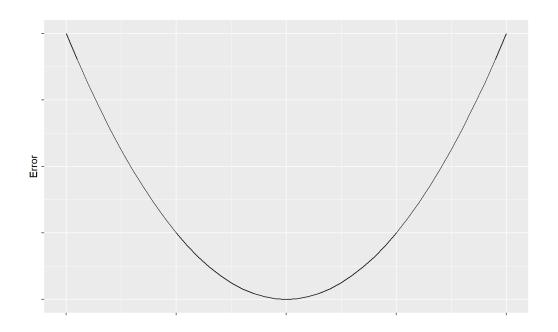


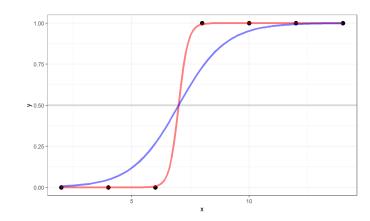
https://www.analyticsvidhya.com/blog/2015/11/beginners-guide-on-logistic-regression-in-r/

# 파라메터와오차



### **Loss function**

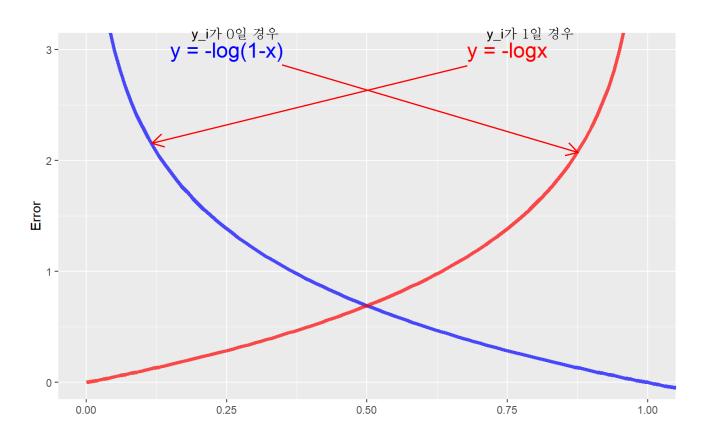




### 로그 함수

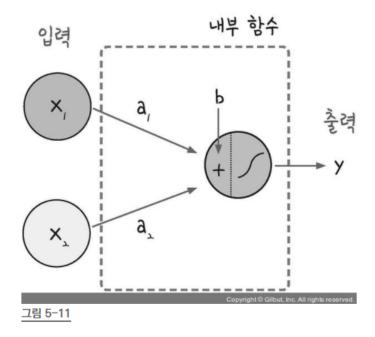
$$J( heta) = -rac{1}{m} \sum_{i=1}^m [y_i log(h_ heta(x_i)) + (1-y_i) log(1-h_ heta(x_i))]$$

where, 
$$h_{ heta}(x_i)=rac{1}{1+e^{- heta x}}, \ \ y\in 0,1$$



# 로지스틱 회귀와 perceptron

$$f(X) = rac{1}{1 + e^{-(a_1 x_1 + a_2 x_2 + b)}}$$



로지스틱 회귀를 퍼셉트론 방식으로 표현한 예