2class Logistic (Y_0, Y_1)

$X : Y_1$ if $P(Y_1|X) > P(Y_0|X)$
$X : Y_0$ if $P(Y_1|X) < P(Y_0|X)$

$P(Y_1|X) \propto P(X|Y_1) \cdot P(Y_1)$
$P(Y_0|X) \propto P(X|Y_0) \cdot P(Y_0)$

$\Rightarrow \boxed{\frac{P(Y_1|X)}{P(Y_0|X)}} = \frac{P(X|Y_1) \cdot P(Y_1)}{P(X|Y_0) \cdot P(Y_0)}$ // Odds

$a_k = \ln(P(X|Y_k) \cdot P(Y_k))$ 라 하자.

$$P(Y_1|X) = \frac{P(X|Y_1)P(Y_1)}{P(X|Y_1)P(Y_1) + P(X|Y_0)P(Y_0)} = \frac{e^{a_1}}{e^{a_1} + e^{a_0}} = \frac{1}{1 + e^{a_0 - a_1}} \cdots ①$$

$$a_1 - a_0 = \log\left(\frac{P(X|Y_1)P(Y_1)}{P(X|Y_0)P(Y_0)}\right) = \log\left(\frac{P(Y_1|X)}{P(Y_0|X)}\right) = \text{logit} = X\beta \cdots ②$$

∴ ①, ② 에 의해 $P(Y_1|X) = \frac{1}{1 + e^{-X\beta}}$