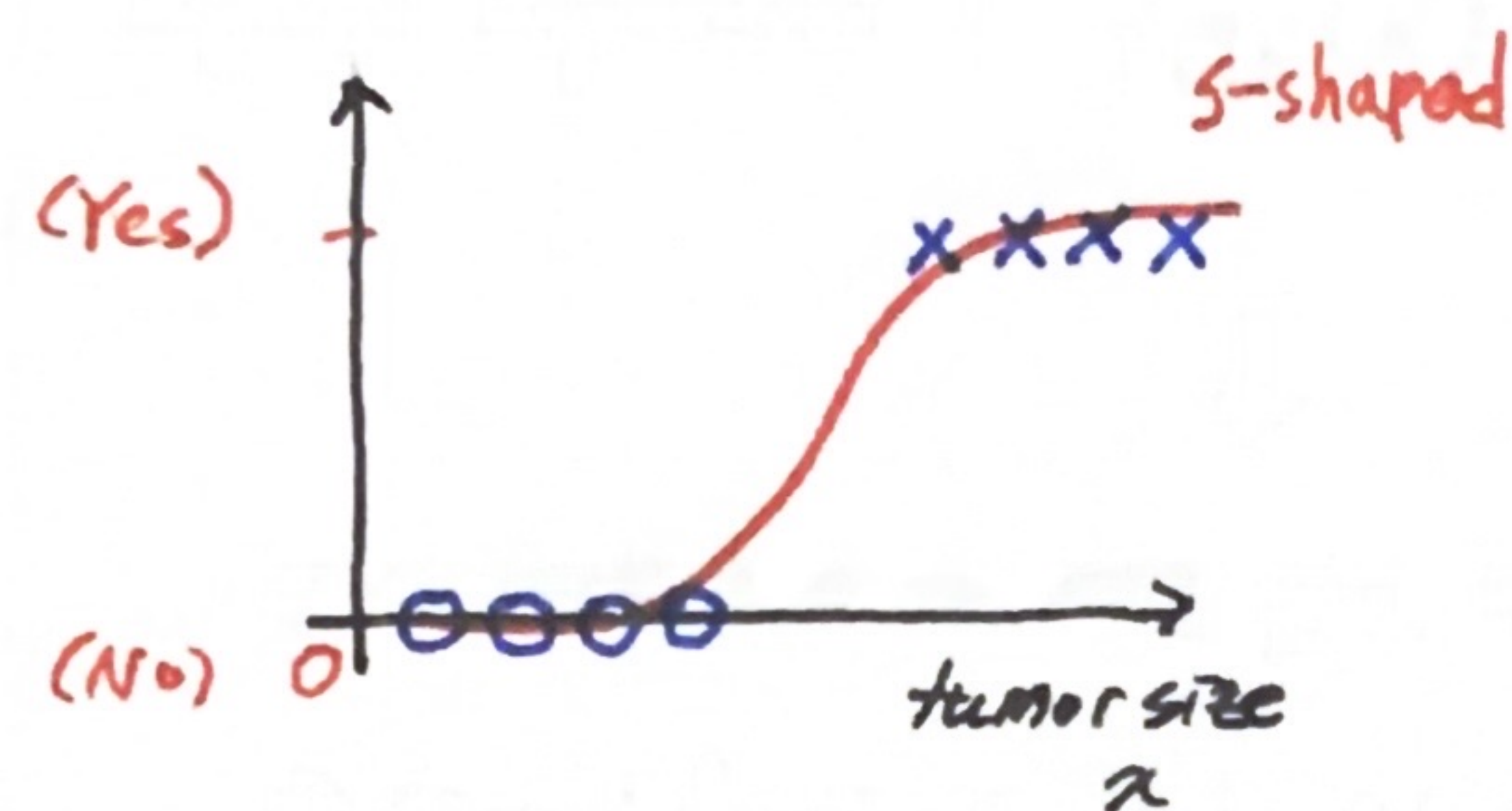


< Logistic Regression >

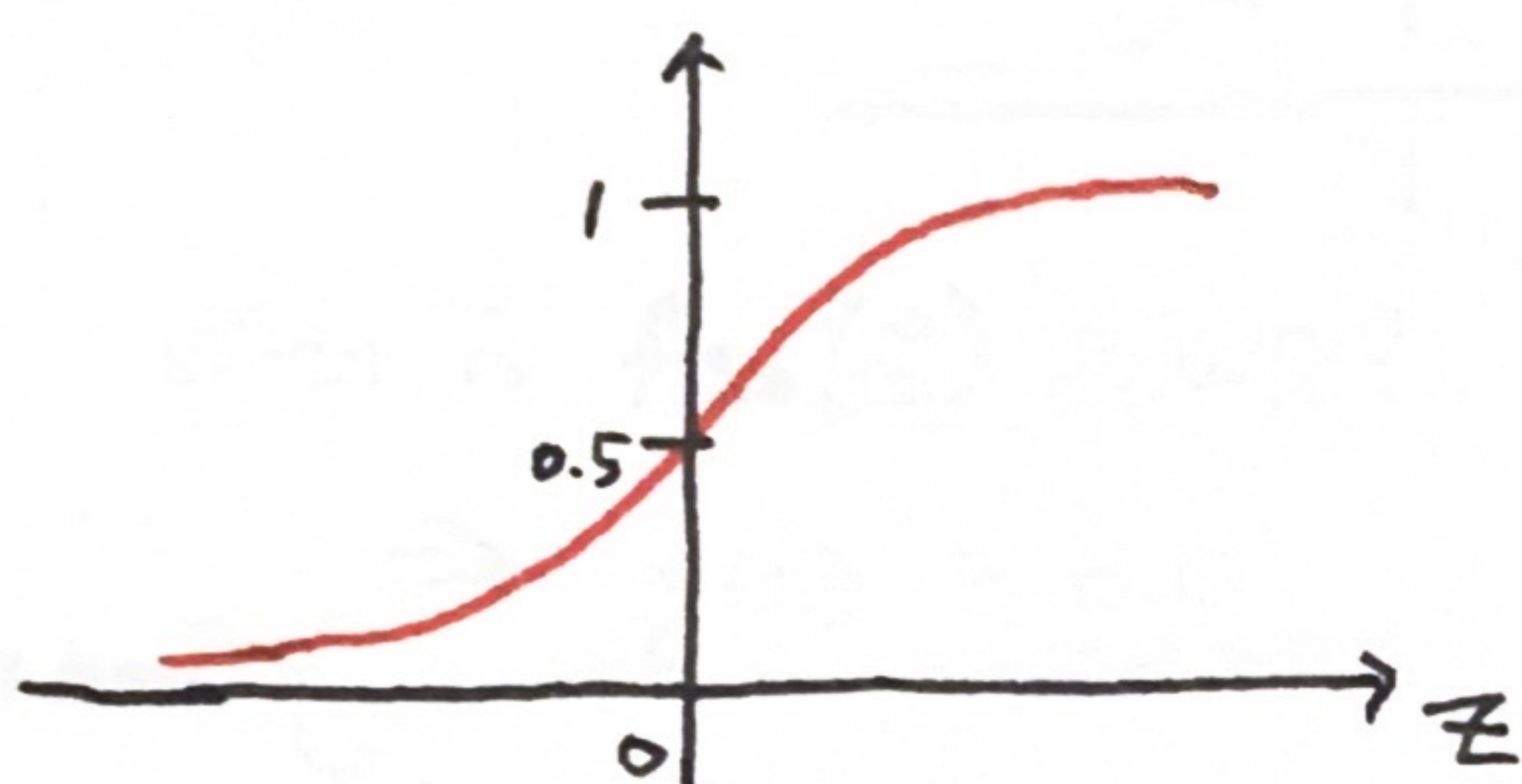


Logistic Regression is fit a curve to data set (S-shaped)

⇒ To build to make outputs of logistic regression model that have only 0 and 1 (classification)
 : sigmoid function (logistic function)

< Sigmoid function >

- Logistic Regression의 hypothesis output은 0과 1 사이의 값만 갖도록 설정
- 이를 가능하게 하면서 기본적인 함수가 sigmoid function



⇒ sigmoid function :

$$g(z) = \frac{1}{1 + e^{-z}} \quad , \quad 0 < g(z) < 1$$

- sigmoid function의 z 에 z 에 관한 함수를 대입하여 hypothesis를 만들 수 있음.
- ↓
linear regression의 hypothesis를 대입하면...

① Linear regression hypothesis: $f_{\vec{w}, b}(\vec{z}) = \vec{w} \cdot \vec{z} + b$

② z 에 대입: $z = \vec{w} \cdot \vec{x} + b$

③ z 를 sigmoid function에 대입:

$$f_{\vec{w}, b}(\vec{z}) = g(z) = \frac{1}{1 + e^{-z}} = \frac{1}{1 + e^{-(\vec{w} \cdot \vec{x} + b)}}$$

"Logistic Regression Model"

< Interpretation of logistic regression output >

$$f_{\vec{w}, b}(\vec{x}) = \frac{1}{1 + e^{-(\vec{w} \cdot \vec{x} + b)}}$$

⇒ "probability" that class is 1

⇒ 주어진 feature가 x 값일때 output의 class가 1인 확률

$$\Rightarrow f_{\vec{w}, b}(\vec{x}) = P(y=1 | \vec{x}; \vec{w}, b)$$

= Probability that output y is 1, given input \vec{x} , with parameters \vec{w}, b

ex) $f_{\vec{w}, b}(\vec{x}) = 0.7$

⇒ ∵ $P(y=0) + P(y=1) = 1$

= output이 1인 확률 : 70%, 0인 확률 : 30%