

What does $P(Y_i = 1|X_i)$ represent in logistic regression? (Select all that apply.)

- ☐ The probability that the explanatory variable(s) is (are) greater than zero. The probability that the explanatory variable(s) is (are) greater than zero.
- ☒ The probability of a success $Y_i = 1$ given the information contained in the explanatory variable(s).
- ☐ The probability that $\beta_0 + \beta_1 x_i$ is greater than zero.
- ☐ The probability that $Y_i - \epsilon_i$ is one.

Which symbol is used to represent the notation $P(Y_i = 1|X_i)$ in logistic regression? (Select all that apply.)

- ☐ \sum_i
- ☐ σ_i
- ☐ ϵ_i
- ☒ π_i

The mathematical model for simple logistic regression is given by

$$P(Y_i = 1) = \frac{e^{\text{stuff}}}{1 + e^{\text{stuff}}} = \pi_i$$

What is the correct content for the "stuff" in the equation above?

- ☒ A simple linear regression of the form $\beta_0 + \beta_1 x_i$.
- ☐ A t Test of the form $\mu_1 - \mu_2$.
- ☐ An ANOVA model of the form $\mu + \alpha_i + \epsilon_{ij}$
- ☐ A Wilcoxon Model of the form $\sum R_i$.

With some algebra, the simple logistic regression model can be reorganized as

$$\frac{\pi_i}{1 - \pi_i} = e^{\beta_0} e^{\beta_1 x_i}$$

Select all statements that are true for this equation.

- ☒ $\frac{\pi_i}{1-\pi_i}$ is the odds of success, i.e., the odds that $Y_i = 1$.
- ☒ The odds of success equal e^{β_0} when $x_i = 0$.
- ☒ The odds of success increase by the factor of e^{β_1} for every one unit increase in x_i .
- ☐ The odds of success always increase as x_i gets larger.

In the **challenger** simple logistic regression example, the estimated value of β_1 is $b_1 = -0.232$. How is this value interpreted?

A unit in outside temperature results in a change in the odds of an o-ring failure.

Use the logistic regression model of the **challenger** example to answer the following question. (The graphic of that example would be a great place to look.) If the decision was made to only launch when there was less than a 20% risk of an o-ring failure, what would the minimum “safe launch temperature” be?

°F

When is it appropriate to use the Hosmer-Lemeshow goodness of fit test for a logistic regression model?

- ☐ When there are repeated x-values in the data.
- ☒ When there are very few or no repeated x-values in the data.