Hypothesis Testing and Assumptions for Linear Regression

$$H_0 : \beta_1 = 0 \qquad H_a : \beta_1 \neq 0$$

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

line in the population
differs from zero
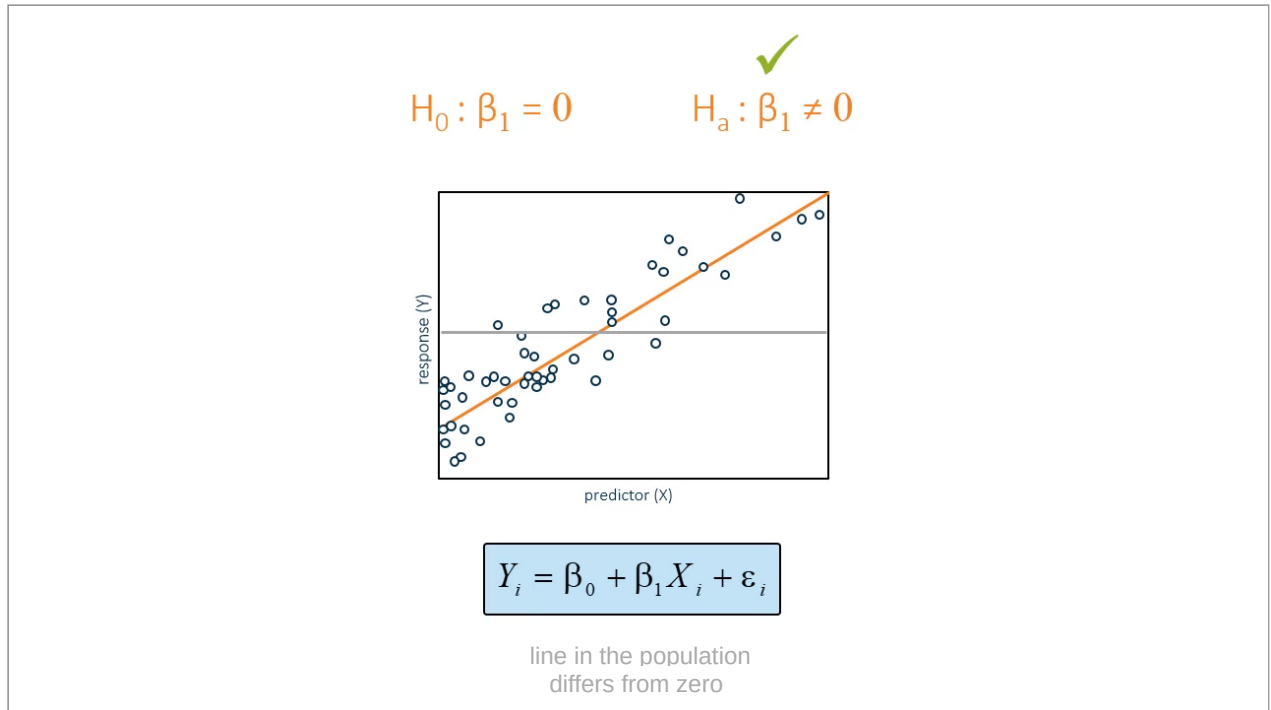
English

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0:00 If the estimated simple linear regression model does not fit the data better than the baseline model, you fail to reject the null hypothesis. Thus, you do not have enough evidence to say that the slope of the regression line in the population differs from zero. If the estimated simple linear regression model does fit the data better than the baseline model, you reject the null hypothesis. Thus, you do have enough evidence to say that the slope of the regression line in the population differs from zero and that the predictor variable explains a significant amount of variability in the response variable. Notice that the null hypothesis is about the slope and doesn't involve the intercept. For a simple linear regression analysis to be valid, four assumptions need to be met. The first assumption is that the mean of the response variable is linearly related to the value of the predictor variable. In other words, a straight line connects the means of the response variable at each value of the predictor variable. The next three assumptions are the same as for ANOVA.That is, the error terms are normally distributed with a mean of 0, the error terms have equal variances, and the error terms are independent at each value of the predictor variable. For now, consider these