

Hypothesis Testing

Construct the t-statistic:
$$t - stat = \frac{\hat{\beta}_1 - \beta_1}{SE_{\beta_1}}$$

where:
 $\hat{\beta}_1$ = estimated value of β_1
 β_1 = hypothesized value of β_1 (from H_0)
 SE_{β_1} = estimated SD of β_1 (SE from regression)

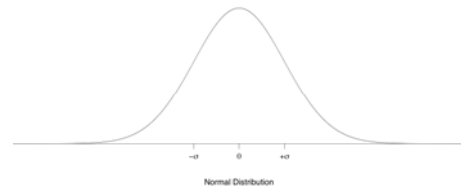
Hypotheses:

- α = Significance Level = Probability of rejecting a true null hypothesis
- p-value = Smallest value of α at which null hypothesis can be rejected (probability you would obtain a t-stat larger than what you got)

Two-sided

$$H_0 : \beta_1 = 0$$

$$H_A : \beta_1 \neq 0$$

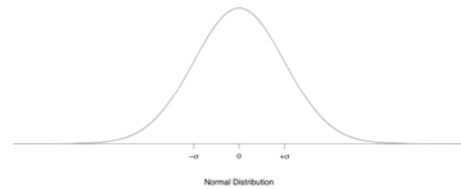


If $|t\text{-stat}| > t_{\alpha/2, (n-2)}$ → Reject H_0
 If p-value $< \alpha$ → Reject H_0

If $|t\text{-stat}| \leq t_{\alpha/2, (n-2)}$ → Fail to reject H_0
 If p-value $\geq \alpha$ → Fail to reject H_0

One-sided

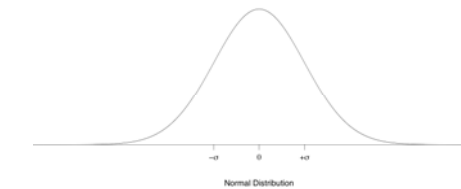
(a) $H_0 : \beta_1 \leq 0$
 $H_A : \beta_1 > 0$



If t-stat $> t_{\alpha, (n-2)}$ → Reject H_0
 If p-value $/_2 < \alpha$ and t-stat > 0 → Reject H_0

If t-stat $\leq t_{\alpha, (n-2)}$ → Fail to reject H_0
 If p-value $/_2 \geq \alpha$ or t-stat ≤ 0 → Fail to reject H_0

(b) $H_0 : \beta_1 \geq 0$
 $H_A : \beta_1 < 0$



If t-stat $< -t_{\alpha, (n-2)}$ → Reject H_0
 If p-value $/_2 < \alpha$ and t-stat < 0 → Reject H_0

If t-stat $\geq -t_{\alpha, (n-2)}$ → Fail to reject H_0
 If p-value $/_2 \geq \alpha$ or t-stat ≥ 0 → Fail to reject H_0