Nested Models

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_{12} + \varepsilon$$

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

vs $H_0 : \beta_4 = \beta_5 = 0$

H_A : not both 0

or

at least one of $\beta_4, \beta_5 \neq 0$

$F_{2,16} = 4.6638$; $p = 0.02536$

as $p < \alpha = 0.05$

reject H_0 in favor of H_A

and conclude we need at least one of these additional terms in the model