Jacob Miller Homework 6, problem 1

y = severity of injury
x_1 = weight & distance
x_2 = hard hat
x_3 = bump cap

$$E(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3$$

a) $E(y|x_1, \text{hard hat}) = \beta_0 + \beta_1 x_1 + \beta_2 \cdot 1 + \beta_3 \cdot 0$

$= \underline{\beta_0 + \beta_2 + \beta_1 x_1}$

$E(y|x_1, \text{bump cap}) = \beta_0 + \beta_1 x_1 + \beta_2 \cdot 0 + \beta_3 \cdot 1$

$= \underline{\beta_0 + \beta_3 + \beta_1 x_1}$

$E(y|x_1, \text{no protection}) = \beta_0 + \beta_1 x_1 + \beta_2 \cdot 0 + \beta_3 \cdot 0$

$= \underline{\beta_0 + \beta_1 x_1}$

b) 1) $H_0: \beta_3 = 0 \rightarrow E(y|x_1, \text{bump cap}) = E(y|x_1, \text{no protection})$

$H_a: \beta_3 \neq 0 \rightarrow E(y|x_1, \text{bump cap}) \neq E(y|x_1, \text{no protection})$

2) $H_0: \beta_2 = \beta_3 \rightarrow E(y|x_1, \text{hard hat}) = E(y|x_1, \text{bump cap})$

$H_a: \beta_2 \neq \beta_3 \rightarrow E(y|x_1, \text{hard hat}) \neq E(y|x_1, \text{bump cap})$