1. A two-way ANOVA model in regression form will always have as many indicator variables as factor level combinations.

   True

   False

2. Suppose that we have one factor, $\tau$ , with 3 levels and another factor, $\alpha$, at 3 levels. Assuming no interaction, the regression form of this model is:

   $Y_i = \beta_0 + \beta_1\tau_{i,1} + \beta_2\tau_{i,2} + \beta_3\alpha_{i,1} + \beta_4\alpha_{i,2} + \varepsilon_i$ where $\varepsilon_i \overset{iid}{\sim} N(0, \sigma^2)$.

   True

   False

3. Suppose that the following regression model corresponding to a two-way ANOVA is correct (factors $\tau$ with levels 1-2 and $\alpha$ with levels 1-2):

   $Y_i = \beta_0 + \beta_1\tau_{i,1} + \beta_2\alpha_{i,1} + \varepsilon_i$ where:

   - $\tau_{i,1} = 1$ if the $i^{th}$ unit is in the first level of $\tau$ and $\tau_{i,1} = 0$ if the $i^{th}$ unit is in the second level of $\tau$.
   - $\alpha_{i,1} = 1$ if the $i^{th}$ unit is in the first level of $\alpha$ and $\alpha_{i,1} = 0$ if the $i^{th}$ unit is in the second level of $\alpha$.
   - $\varepsilon_i \overset{iid}{\sim} N(0, \sigma^2)$.

   The mean of the response for all units in the the second level of $\tau$ and the second level of $\alpha$ is:

   $\mu_{1,2} = \beta_1 + \beta_2$

   $\mu_{2,2} = \beta_0$

   $\mu_{1,2} = \beta_0 + \beta_1$

   $\mu_{1,2} = \beta_0 + \beta_1 + \beta_2$

4. Suppose that the following regression model corresponding to a two-way ANOVA is correct (factors $\tau$ with levels 1-4, and $\alpha$ with levels 1-2):

   $Y_i = \beta_0 + \beta_1\tau_{i,1} + \beta_2\tau_{i,3} + \beta_3\tau_{i,4} + \beta_4\alpha_{i,1} + \varepsilon_i$ where:

   - $\tau_{i,1} = 1$ if the $i^{th}$ unit is in the first level of $\tau$ and $\tau_{i,1} = 0$ if the $i^{th}$ unit is in any other level of $\tau$.
   - $\tau_{i,3} = 1$ if the $i^{th}$ unit is in the third level of $\tau$ and $\tau_{i,3} = 0$ if the $i^{th}$ unit is in any other level of $\tau$.
   - $\tau_{i,4} = 1$ if the $i^{th}$ unit is in the fourth level of $\tau$ and $\tau_{i,4} = 0$ if the $i^{th}$ unit is in any other level of $\tau$.
   - $\alpha_{i,1} = 1$ if the $i^{th}$ unit is in the first level of $\alpha$ and $\alpha_{i,1} = 0$ if the $i^{th}$ unit is in the second level of $\alpha$.
   - $\varepsilon_i \overset{iid}{\sim} N(0, \sigma^2)$.

   The mean of the response for all units in the the second level of $\tau$ and the second level of $\alpha$ is:

   $\mu_{2,2} = \beta_0 + \beta_1 + \beta_2$

   $\mu_{2,2} = \beta_0$

   $\mu_{2,2} = \beta_2 + \beta_2$

   $\mu_{2,2} = \beta_0 + \beta_4$