1. A one-way ANOVA model with a J-level factor is a multiple linear regression model with J predictor/explanatory variables, and a continuous response.

   True

   False

2. Consider an experiment conducted to study the effectiveness of different *hand washing techniques* (factor) on the *prevalence of bacteria* (response). The experiment tested four different methods—washing with water only, washing with regular soap, washing with antibacterial soap (ABS), and spraying hands with antibacterial spray (AS) (containing 65% ethanol as an active ingredient). Ten different hand washings were included within each level (i.e., ten people washed with water only, with regular soap, etc.).

   In the regression context, which of the following correctly gives the dimensions of the design matrix, X?

   40 rows and 3 columns

   10 rows and 3 columns

   10 rows and 4 columns

   40 rows and 4 columns

3. Consider an experiment conducted to study the effectiveness of different *hand washing techniques* (factor) on the *prevalence of bacteria* (response). The experiment tested four different methods—washing with water only, washing with regular soap, washing with antibacterial soap (ABS), and spraying hands with antibacterial spray (AS) (containing 65% ethanol as an active ingredient). Ten different hand washings were included within each level (i.e., ten people washed with water only, with regular soap, etc.).

   Whitney mistakenly sets up a one-way ANOVA regression model with four indicator variables--one for each level. What consequences does this mistake have?

   The regression model is non-identifiable.

   $\hat{\beta} = (X^T X)^{-1} X^T \mathbf{Y}$ cannot be accurately from the data.

   The matrix $X^T X$ (where X is the design matrix) is invertible.

   The matrix $X^T X$ (where X is the design matrix) is not invertible.

4. Which of the following are benefits of casting one-way ANOVA as a linear regression model?

   Casting one-way ANOVA as a linear regression model allows us to rely on least squares (or maximum likelihood) to estimate our parameters.

   Casting one-way ANOVA as a linear regression model allows us to rely on the interpretation of regression parameters to answer our research questions of interest.

   Casting one-way ANOVA as a linear regression model provides a set of inference techniques (e.g., t-tests, F-tests) that might help us answer research questions of interest.