1) Correlations
   a) Correlation between two variables ignoring all other variables: zero-order correlation
   b) Correlation between two variables controlling other variables:
      i) Partial correlation
      ii) Semipartial correlation
   c) Correlation of one variable with several variables: multiple correlation

2) Estimates of the population squared multiple correlation coefficient
   a) $R^2$
   b) $R^2_c$ (corrected squared multiple correlation coefficient; adjusted squared multiple correlation coefficient)

3) Parameters of the linear multiple regression model (i.e., no power or product terms in the model: $Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k + \varepsilon$)
   a) Intercept—$\alpha$
   b) Partial regression coefficients (synonyms are slope and regression coefficient)—$\beta_j$
   c) Conditional variance—$\sigma^2_{Y_i,\ldots,X_k}$ (the square root of the conditional variance is called the standard error of measurement—$\sigma_{Y_i,\ldots,X_k}$)

4) Factors that affect validity of causal inference
   a) Reliability of independent variables
   b) Correct form of the regression equation
   c) Validity of measurements

5) Inference
   a) Hypothesis tests
      i) Omnibus null hypothesis—statement that there is no relationship between $Y$ and several $X$s.
         (1) There are multiple equivalent forms of the omnibus hypothesis
         (2) All equivalent form are tested using the $F$ statistic
      ii) Specific hypothesis—statement that there is no relationship between $Y$ and one $X$, controlling for the other $X$s
         (1) There are multiple equivalent forms of the omnibus hypothesis
         (2) All equivalent form are tested using the $t$ statistic, which can be computed by using
            (a) $b_j$ and $S_{b_j}$
            (b) $n$, $k$, and the partial correlation.
   b) Confidence intervals
      i) For a slope
      ii) For a partial correlation coefficient

6) Polynomial models for one independent variable—used to model curved relationships of one $Y$ and one $X$.
   a) Linear model: $Y = \alpha + \beta X + \varepsilon$ (also a special case of the mode in 3)
b) Quadratic model: \( Y = \alpha + \beta_1 X + \beta_2 X^2 + \epsilon \)
   i) \( \beta_1 \)—instantaneous rate of change at \( X = 0 \) parameter
   ii) \( \beta_2 \)—curvature parameter

c) Cubic model: \( Y = \alpha + \beta_1 X + \beta_2 X^2 + \beta_3 X^3 + \epsilon \)

d) Etc.

7) Multiple regression models with polynomial terms and or product terms
   a) Multiple independent variables with quadratics
      i) \( Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_2^2 + \epsilon \)
      ii) \( Y = \alpha + \beta_1 X_1 + \beta_2 X_1^2 + \beta_3 X_2^2 + \beta_4 X_2^2 + \epsilon \)
   b) Linear by linear interaction: \( Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 X_2 + \epsilon \)
   c) Interactions with quadratics
      i) Changing the instantaneous rate of change parameter:
         \( Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_2^2 + \beta_4 X_1 X_2 + \epsilon \)
      ii) Changing the curvature parameter: \( Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_2^2 + \beta_4 X_1 X_2^2 + \epsilon \)
      iii) Changing the location and curvature parameter:
         \( Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_2^2 + \beta_4 X_1 X_2 + \beta X_1 X_2^2 + \epsilon \)

8) Criteria for screening a model
   a) Residual plots
      i) Plot of studentized residual vs. predicted values
      ii) Plot of studentized residual vs. \( X \)s (not including powers and products)
   b) Multicollinearity
      i) Tolerance—low is bad
      ii) Variance inflation factor (VIF)—high is bad
   c) Residuals
   d) Leverage—measured by \( H \)
   e) Influence diagnostics
      i) Influential of data points on predicted values
         1) Cook’s distance
         2) DFFITS
      ii) Influence of data points on intercept and slopes—DFBETAS