Regression Analysis: Summary

1. **Make a Prediction**
   For an individual, predict the value of the dependent variable, given the values of some of the explanatory variables.
   - Process: "Regress" the dependent variable onto the given explanatory variables. Then "Predict." Fill in the values of the explanatory variables. Hit the "Predict" button.
   - Answer: (prediction) ± (~2)·(standard error of prediction)

2. **Estimate a Group Mean**
   For a group of similar individuals (i.e., individuals with the same values for several explanatory variables), estimate the mean value of the dependent variable.
   - Process: "Regress" the dependent variable onto the given explanatory variables. Then "Predict." Fill in the values of the explanatory variables. Hit the "Predict" button.
   - Answer: (prediction) ± (~2)·(standard error of estimated mean)

3. **Measure a Pure Effect**
   A one-unit difference in an explanatory variable, when everything else of relevance remains the same, is typically associated with how large a difference in the dependent variable?
   - Process: "Regress" the dependent variable onto *all* of the relevant explanatory variables (i.e., use the "most complete" model available).
   - Answer: (coefficient of explanatory variable) ± (~2)·(standard error of coefficient)

4. **Modelling: Why Does the Dependent Variable Vary?**
   What fraction of the variance in the dependent variable (from one individual to another) can potentially be explained by the fact that the explanatory variables in our model vary (from one individual to another)?
   - Process: "Regress" the dependent variable onto the explanatory variables currently under consideration. Then look at the "adjusted coefficient of determination" (synonymously, "the adjusted r-squared").

5. **Modelling: Relative Explanatory Importance**
   Considering a set of explanatory variables, rank them in order of importance in helping to explain why the dependent variable varies.
   - Process: "Regress" the dependent variable onto the target set of explanatory variables. Rank the variables in order of the absolute values of their beta-weights, from largest (most important in explaining variation in the dependent variable) to smallest (least important in explaining variation).

6. **Modelling: Which Variables "Belong" in the (Current) Model?**
   How strong is the evidence that each explanatory variable has a non-zero coefficient (i.e., plays a predictive role) in the current model?
   - Process: "Regress" the dependent variable onto the (current) set of explanatory variables. For each explanatory variable, examine the "significance level" (synonymously, the "p-value") of the sample data with respect to the null hypothesis that the true coefficient of that variable is zero.
   - The closer the significance level is to 0%, the stronger is the evidence against that null hypothesis (i.e., the stronger is the evidence that this variable ***does*** indeed belong in the current model).