2. Exploratory Data Analysis & Descriptive Statistics

2.1 Examples of Random Variables & Associated Data Types

- **NUMERICAL** *(Quantitative measurements)*
  - Continuous: $X =$ Length, Area, Volume, Temp, Time elapsed, pH, Mass of tumor
  - Discrete: $X =$ Shoe size, # weeks till death, Time displayed, Rx dose, # tumors

- **CATEGORICAL** *(Qualitative “bins”)*
  - Nominal: $X =$ Color (1 = Red, 2 = Green, 3 = Blue), ID #, Zip Code, Type of tumor

Random variables are important in experiments because they ensure objective reproducibility (i.e., verifiability, replicability) of results.

In any given study, the researcher must first decide what percentage of replicated experiments should, in principle, obtain results that correctly agree (specifically, accept a true hypothesis), and incorrectly agree (specifically, reject a true hypothesis), allowing for random variation.

**Confidence Level:** $1 - \alpha = 0.90, 0.95, 0.99$ are common choices…

**Significance Level:** $\alpha = 0.10, 0.05, 0.01$ the corresponding error rates