

STATS 275: Statistical Consulting

Some Preliminary Concepts ¹

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¹Based on “Principles of Applied Statistics” by Cox and Donnelly

Component of investigations

- Formulation of research questions
- Search for relevant data and domain knowledge
- Design and implementation of investigations to obtain appropriate data
- Analysis of data; statistical inference
- Interpretation of the results; translation of findings into a subject-matter context; making (or facilitating the process of making) decisions

Things to consider before investigations

- Units of analysis
- Relationship between design and analysis
- Experiments vs. observational studies
- Prediction vs. understanding underlying mechanisms (e.g., hypothesis testing)
- Principles of measurements
 - ▶ measurements actually record the features of subject-matter concerns
 - ▶ measurements concisely capture the important aspects
 - ▶ cost vs. importance

Types and phases of analysis

- Analysis should be as simple as needed
- It should be transparent and reproducible
- Typically, analysis involves these four phases:
 - ▶ Data auditing and screening
 - ▶ Preliminary analysis
 - ▶ Formal analysis
 - ▶ Presentation and conclusion
- Preliminary analysis sometimes involves some algorithmic methods.