Introduction

- **Problem**: Where do students get stuck?
- **Goal**: Understand when students seek help in office hours (OH)
- Courses teach **different** problem-solving processes as scaffolding
- To **compare** across courses, we need a common language around problem-solving
- **UPIC abstracts** a problem-solving process into four phases
- We applied UPIC to survey responses students provided before joining an online office hour queue for a CS1 and intermediate data science (DS) course

Method

- For each OH interaction, students reported in the pre-survey their current UPIC phase
- The CS1 used the 7-steps terminology, a problem-solving process explicitly taught in that class (see table)
- The DS course did not have a problem-solving process, so designed options using UPIC to replace an open textbox
- Data set:
  - **CS1**: Fall 2020 (Fa20) to Spring 2022 (Sp22)
  - **DS**: Spring 2021 (Sp21) to Sp22
  - From Duke University, a medium private R1

Findings

- **CS1**
  - Implementation most common for 3 semesters
  - Correctness usually second most common
  - Understand and Plan least common
- **DS**
  - Greater variation, maybe due to autograder added in Fa21?
  - Sp21 Understand most common
  - Fa21 & Sp22 Plan least common

UPIC

1. **Understand** the problem
2. Create a **Plan**
3. **Implement** the plan
4. Verify **Correctness/debug**

![UPIC Graphs]

Implications

- **UPIC** enables aggregating different problem-solving processes for easier comparison
- Knowing the most common reason students seek help can inform TA training
- Autograders potentially influence when students seek help
- Teachers with no explicit problem-solving process could use UPIC to see where students struggle or to create a process

Would you use UPIC?

How?

What else should we look for in the data?