CS50 Week 3

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Questions?

From Last Week

github.com/cjleggett/2021-section

Grading

- Problem Sets: 40%
- Quizzes: 10%
- Labs: 10%
- Test: 20%
- Final Project: 10%
- Attendance: 10%

Problem Sets (40%)

- Due Sundays at midnight
- Extensive coding exercises
- Graded on:
  - Correctness: Does it work? (Aim for 5s on this)
  - Design: Is the code well-designed? (Aim for 3-4 on this, maybe some 5s)
  - Style: Is the code **understandable**? (Aim for 4s and 5s on this)
- Scale of 1-5
- Stress Level: 🙈🙈🙈🙈
- Fun Level: 🙈🙈🙈🙈

Quizzes (10%)

- Due Tuesdays at noon
- **Short** comprehension questions about lecture
- Keep your answers **short**
- I can't help you directly with these
- Scale of 0-3
- Stress Level: 🙈
- Fun Level: 🙈

Labs: 10%

- Due Thursdays at midnight
- We will start and finish labs in class!!!
- Help you get started on psets
- Stress Level:
- Fun Level: 🙈🙈🙈🙈🙈

Test (20%)

- You'll have 5 days to do this
- Can't ask for help from staff, Ed, or other students
- **Can** look up things on google
- Not for a suuuper long time
- Stress level: 🙈🙈🙈🙈🙈
- Fun Level: 🙈🙈

Final Project (10%)

- You get to choose what to do for this project
- You'll have time to do it and can ask for help
- Work in groups of 1-3
- Stress Level: 🙈🙈🙈
- Fun Level: 🙈🙈🙈🙈🙈

Attendance (10%)

- Must go to lecture or section
- If you can't go to section, find another section to go to for that week
- If you can't go to lecture, email heads@cs50.harvard.edu
- Stress Level: 🙈
- Fun Level: 🙈🙈🙈🙈

Questions?

Content

Structs

```
typedef struct
{
    int id;
    string name;
    float gpa;
}
 student;
```

```
student alice;
alice.id = 43;
alice.name = “Alice Riley”;
alice.gpa = 3.47;

// alice did well in CS50!
alice.gpa += .25;
```

Recursion

- What are my base cases?
- What are my recursive steps?
- Example: countdown

Sorting

https://visualgo.net/bn/sorting

Practice Problems

structs1.c

- Task: define a struct for a date, then write a function that prints out the date in a readable format
- Expected behavior:
  ./struct1.c
  September 25, 2019
- Work Setting: We'll do this one as a class

scope.c

- Task: Without running the code, try to predict the outcome of the program outlined here: https://tinyurl.com/sjjt6ymu
- Work setting: In groups of 2-3

algorithms.c

- Task: In this algorithms file, we will write and test out several functions.
- Source code:

  https://tinyurl.com/rdd4fsk5

factorial

- Task: Write a program that takes in a non-negative integer n, and returns n! using recursion.
- Expected Behavior:
  factorial(5) returns 120
  factorial(2) returns 2
- Work Setting: In pairs, with ONE person typing

fibonacci

- Task: Write a function that takes in a non-negative integer n, and returns the nth fibonacci number
- Expected Behavior:
  - fibonacci(0) returns 1
  - fibonacci(1) returns 1
  - fibonacci(n) returns fibonacci(n-1) + fibonacci(n-2)
- Work Setting: In pairs

Bubble Sort

- Task: Write a function that implements bubble sort on an array of 5 integers
- What is a bubble sort?
- Expected Behavior:
  - bubble([1, 2, 6, 22, 5]) returns [1, 2, 5, 6, 22]
- Work Setting: In pairs

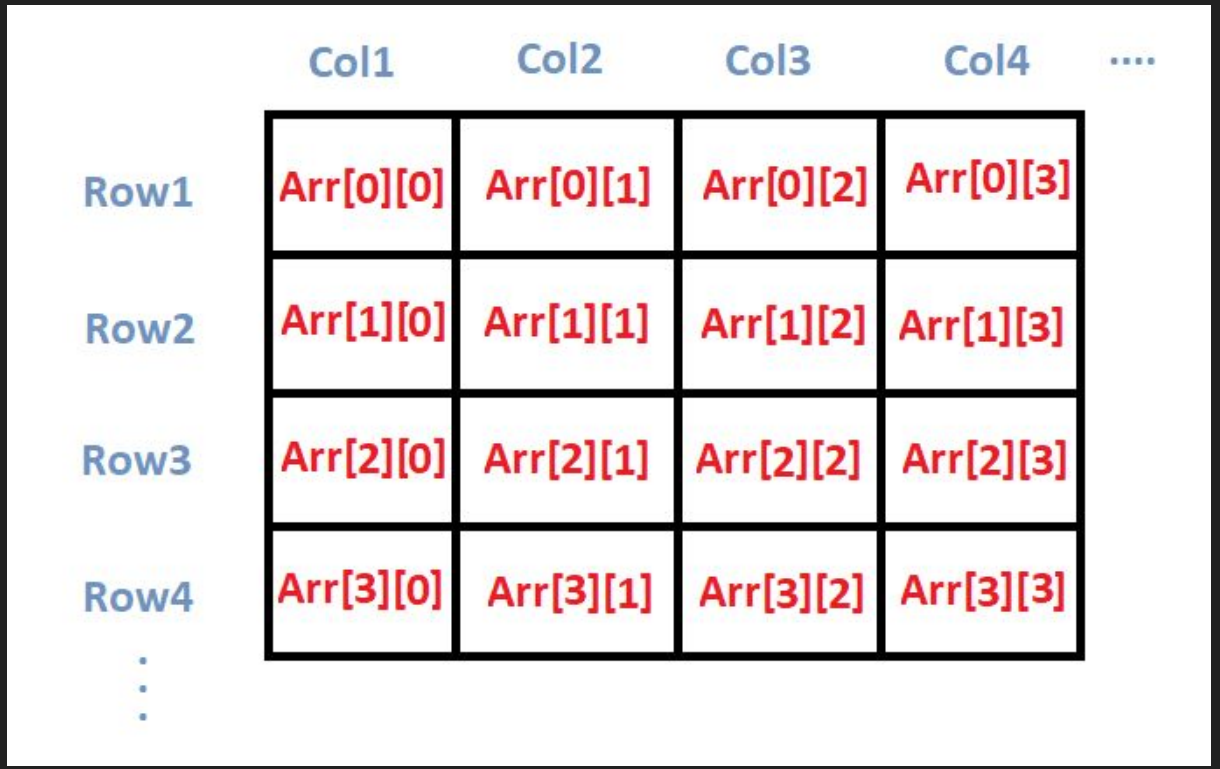
Lab: Sorting

- Let's take a look at the instructions together
- Then we'll split up into smaller groups

Problem Set Preview: Voting

- You will write code that helps to implement voting algorithms: Plurality, Runoff, and **maybe** tideman.
- My Advice:
  - Spend LOTS of time reading the specification and looking at code before you begin.
  - Watch the walkthroughs!
  - Sign up for tutorials
  - Ask questions on Ed

2-dimensional arrays



Selection Sort

- Task: Write a function that implements a selection sort on an array of 5 integers
- What is a selection sort?
- Expected Behavior:
  - bubble([1, 2, 6, 22, 5]) returns [1, 2, 5, 6, 22]
- Work Setting: In pairs

Challenge: recursive palindrome

- Task: Write a function that takes in a string expressed as an array of chars, and determines whether or not it is a palindrome **recursively**
- Expected Behavior:
  - pal([‘a’, ‘b’, ‘a’, ‘\0’]) returns true
  - pal([‘a’, ‘b’, ‘c’, ‘\0’]) returns false
- Work Setting: In pairs