# Quiz 3 - Monday

July 29, 2024

## Instructions

- You have time to finish the quiz before the lab session is over. **No need to submit anything for these quizzes**, but you **must** show your codes and results to your TAs before you leave the class. TAs may ask you questions and request you to work with your codes, e.g. asking you to run and compile, add/remove, and debug your program. TAs will provide you with feedback and your grade right away, but the grades will be released on Avenue a few days later.
- During the quizzes using AI generative models, like ChatGPT, is **NOT** allowed, as I believe quizzes are easy enough to be handled. But you can search on the internet, take a look at the lecture notes, talk to your friends, or even having your TA's help.
- The quiz starts at the beginning of the lab sessions, and only those who are present in the class in person can take the quiz. Please don't be late and make sure you are in class 15 min before the quiz starts.

1. **Splitting code into multiple files (1.5 points)**

   (a) Create a header file "q1.h" to include that implements both uncompleted functions in the following snippet: how_many should first ask the user for a maximum number, and then generate a random value between 1 and this maximum. primes(n) should return the first n prime numbers.

```c
 #include <stdio.h>
#include <stdlib.h>

int main() {
    int n = how_many();
    int p = primes(n);
    printf("The %dth prime is %d", n, p)
    return 0;
}
```

   (b) Create a makefile to compile and clean these files, defining at least 4 macros.

2. **Pointers (1 point)**

```c
#include <stdlib.h>

void swap(); //add arguments to this function

int main() {
    int a = 1;
    int b = 2;
    int c = 3;
    return 0;
}
```

(a) Write a function 'swap' that returns nothing and takes three pointers to integers as arguments, and then rotates the values of these elements (so the value of a is now stored in b, b in c, and c in a)

(b) In the main function, swap and then print out these values

(c) What does passing something by reference mean? How does 'swap' use this?

3. **Dynamic memory allocation (1 point)**

(a) Create an array with manually allocated space for 1 integer to start and fill this space with a random integer between 1 and 10.

(b) Repeatedly ask the user (with a while loop) whether they want to add a new number to the array. If they enter 'y', reallocate the array to have space for one more integer and add a random integer between 1 and 10 to fill this space. If they enter 'n', exit the loop.

(c) Print out the average of the array and free the memory you previously allocated.

4. **File input and structs (1.5 points)**

(a) Create a struct containing members for each column/category in sample_csv.csv.

(b) Read and parse the contents of sample_csv.csv into an array of your struct

(c) Print out the names of people with the maximum and mininum ages