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## Question 1

### Run:

Run make in shell. Program outputs will be displayed on stdout.

### Logic:

The following events occur in order:

- CSV file is open and read using system calls
  - `open()` returns a file descriptor
  - `read()` uses the file descriptor to read the contents of the file
- `fork()` is used to create a child process, that will process the averages of section A
- if return value of `fork` is greater than 0, that means the parent process should run (process averages of section A).
- if return value of `fork` is equal to 0, that means the child process should run (process averages of section B)
- `waitpid()` takes `pid` as the argument, waits for the child process to finish executing

In part B of the question, we use threading instead of `fork`.

```
pthread_create(pthread_t *thread, pthread_attr_t *attr, void
```

```
(*start_routine) (void *), void *arg) and pthread_join(pthread_t  
thread, void  
**retval)
```

are used instead of the fork functions.

Error handling is done with the virtue of the above listed functions returning negative values on error, and `errno` can be used to identify the error.

## More about calculating average

We have created a helper function that converts the data of the csv file into a matrix, and then returns values based on the (i,j) given.

To calculate average, we iterate through the matrix, and check if the section matches. If it does, we increase the count of students, and the total marks for each assignment. Finally, we divide the total marks for each assignment by the count of students.