Designs 8 (Pointers)

Graded course work

Important Notes:

- **Write all the programs, from the designs in this handout**
- **Use the same program names, and variable names that I have specified**
- **Compile, run, and test your programs**
- **Submit a copy of these programs to me for grading**
- **If you don't know how to do any particular part, ask me -- I will show you how**

Program (`point4.c`)

1. Copy program `point1.c`, and change it to use floating point numbers.
2. How much memory does floating point numbers use?

Program (`calculator1.c`)

Write a program that asks for an arithmetical sign, and two numbers. It then performs the calculation.

Use float variables for the numbers, and a character variable for the sign.

Program output:

```
Please enter the sign: +
Please enter a number: 2
Please enter a number: 3

2.00 + 3.00 = 5.00

Press any key to continue_
```

Program (paycheck1.c)

Write a program, based on the program class_list1.c, that asks the user for an employee's: name, hourly pay rate, number of regular hours worked, and number of overtime hours worked.

This information should be written (which mode?) to a datafile named paycheck.dat, that datafile should look like:

```
Jim Hill
10.50
40
8
```

Use the variable declarations:

```
char employee_name[25];

int basic_hours = 0,
    overtime_hours = 0;

float pay_rate = 0.0f;

FILE *pointer_to_file;   // the file pointer variable
```

in this program.

Program (paycheck2.c)

Write a program that will open the datafile (which mode?) produced by program paycheck1.c, read the data from that file, and produce the output below:

```
Employee: Jim Hill
Basic pay: $420.00
Overtime pay: $126.00
Gross pay: $546.00
Tax: $109.20
Net pay: $436.80

Press any key to continue_
```

Add these variables to your list of floats:

```
float pay_rate = 0.0f,
      basic_pay = 0.0f,
      overtime_pay = 0.0f,
      gross_pay = 0.0f,
      tax_paid = 0.0f,
      net_pay = 0.0f;
```

The overtime rate is 1.5 times the basic pay rate. Tax is 20% of gross pay.

Program (`bus_route2.c`)

Step 1

Write a program that simulates the run of a bus along a bus route.

The program will ask for:

- The driver's name
- The number of the bus route
- The number of stops on the route
- The number of passengers getting on at each stop

NOTE: The fare is a fixed rate of 75 ¢ for every passenger, and the program will keep track of the total number of passengers who get on the bus during the run.

Program output:

```
Please enter your name: Jim Smith
Please enter the route number: 254
Please enter the number of stops on the route: 3

Stop: 1
        Number of passengers getting on: 12
Stop: 2
        Number of passengers getting on: 15
Stop: 3
        Number of passengers getting on: 10

The total number of passengers on route: 254  was: 37
The total fares collected is: $27.75

Press any key to continue_
```

Use these variable declarations:

```
const float bus_fare = 0.75f;

int route_number = 0,
    number_of_stops = 0,
    stop_number = 0,
    passengers_getting_on = 0,
    total_passengers = 0;

char driver_name[25] = "";
```

Step 2

Upgrade program `bus_route1.c` so that it keeps track of the number of passengers actually on the bus.

To do this it must ask the driver for the number of passengers that get off at each stop.

The program will also “know” that passengers don’t get off at the first stop, or on at the last stop, so it won’t ask that questions.

At the last stop all passengers must get off the bus.

Program output:

```
Please enter your name: Jim Jones
Please enter the route number: 421
Please enter the number of stops on the route: 5

Stop: 1
          Number of passengers getting on: 10
Stop: 2
          Number of passengers getting on: 15
          Number of passengers getting off: 5
Stop: 3
          Number of passengers getting on: 20
          Number of passengers getting off: 10
Stop: 4
          Number of passengers getting on: 5
          Number of passengers getting off: 5

Stop: 5 passengers getting off: 30

The total number of passengers on route: 421  was: 50
The total fares collected is: $37.50

Press any key to continue_
```

Add these new variables:

```
passengers_getting_off = 0,   //
passengers_on_board = 0,
```