ECE 71 – Engineering Computations in C
Test #1 – Professor Kriehn
Tuesday, October 8, 2013

'D' Problem – Homework #13

Write a program that calculates the amount of simple interest earned based upon the principle, an annual interest rate of 5.75%, and time. For simple interest, the equation is given by:

$$I = P\,r\,t$$

where *P* is the principle (in dollars), *r* is the interest rate (per year), and *t* is the time (in years).

Specifications:
Create a project called **HW13** in NetBeans and create a **hw13.c** source file.

Make sure that the first line of **hw13.c** is **/* homework 13 */**.

The program should prompt the user for the principle and the time and calculate the interest based upon a 5.75% rate. Use "**Enter principle:** " as the prompt when scanning in the principle, and "**Enter time:** " as the prompt for the time. The interest *I* and principle *P* should be declared as floating point variables, the interest rate *r* should be defined as a constant, and the time *t* should be declared as an integer. Once the interest is calculated, print the years and interest using a "**%d**" and "**%.2f**" format, respectively. You must use the following variable names for your program:

> **interest** – stores the earned interest *I* (<u>floating point</u>)
> **principle** – stores the initial principle *P* (<u>floating point</u>)
> **RATE** – stores the interest rate *r* (<u>constant</u>)
> **time** – stores the time *t* (<u>integer</u>)

If you execute the program with the following underlined inputs, the results will be:

```
~> hw13.o
Enter principle: 4500.00
Enter time: 3

In 3 years, the simple interest earned is: $776.25
~>
```

When you have double checked your work, submit your program to the grader program.

Use the back page for your Algorithmic Development. This should include your I/O diagram and the pseudocode used to solve the problem.

'C' Problem – Homework #14

Highlight your code from **HW13**, and copy it using **Ctrl-C**. Then close your project, create a new project called **HW14**, and create a **hw14.c** source file. Then hit **Ctrl-V** to copy the old **hw13.c** code into **hw14.c**.

Edit the first line of **hw14.c** so that it is **/* homework 14 */**.

Write a program that calculates the amount of simple interest earned based upon the principle, an annual interest rate of 5.75%, and time. Again, for simple interest, the equation is:

$$I = P\,r\,t$$

where *P* is the principle (in dollars), *r* is the interest rate (per year), and *t* is the time (in years). **However, this time the user will input the time in days, not years, meaning you will have to perform a simple conversion. After reading in the time, divide the result by 365 and store it in a new variable called years. Use your new variable years for *t* in the equation, since the rate *r* is per year, not per day.**

Specifications:
The program should prompt the user for the principle and the time (in days), and calculate the interest based upon a 5.75% rate. Use "**Enter principle:** " as the prompt for the principle, and "**Enter time (in days):** " as the prompt for the time.

The interest and principle should be declared as floating point variables, and the interest rate should be defined as a constant. The time should be declared as an integer, and the new variable used to store the years should be a floating point value. Once you read in the information, print results of the calculation from days to years, in addition to the interest, both using a "**%.2f**" format. Please use the following variable names:

> **interest** – stores the earned interest *I* (<u>floating point</u>)
> **principle** – stores the initial principle *P* (<u>floating point</u>)
> **RATE** – stores the high interest rate *r* (5.75%) (<u>constant</u>)
> **time** – stores the time in days (<u>integer</u>)
> **years** – stores the time *t* in years (<u>floating point</u>)

If you execute the program with the following underlined inputs, the results will be:

> ~> **hw13.o**
> Enter principle: **4500.00**
> Enter time (in days): **300**
>
> In 0.82 years, the simple interest earned is: $212.67
> ~>

When you have double checked your work, submit your program to the grader program. Use the back page for your Algorithmic Development. This should include your I/O diagram, and pseudocode.

'B' Problem – Homework #15

Highlight your code from **HW14**, and copy it using **Ctrl-C**. Then close your project, create a new project called **HW15**, and create a **hw15.c** source file. Then hit **Ctrl-V** to copy the old **hw14.c** code into **hw15.c**.

Edit the first line of **hw15.c** to **/* homework 15 */.**

Write a program that calculates the amount of simple interest earned based upon the principle, **an annual interest rate of either 5.75% or 3.5%**, and time. **You must use an if-else statement.**

Specifications:
The program should prompt the user for the principle and the time, and ask the user which interest rate to use (1 for 5.75%, 2 for 3.5%). Use "**Enter principle:** " as the prompt for the principle, "**Enter time (in days):** " as the prompt for the time, and "**Enter interest rate (1 for high rate, 2 for low rate):** " as the prompt for the interest rate. If the user does not enter a correct number, print an error message that states "**Invalid Interest Rate**".

The interest and principle should be declared as floating point variables, and the two interest rates should be defined as constants. The time should be declared as an integer, as well as a new variable used to store the choice for which interest rate to use. The variable used to store the years should still be a floating point value. Once you read in the information, print results of the calculation from days to years, in addition to the interest, both using a "%.2f" format. Please use the following variable names:

> **interest** – stores the earned interest I (<u>floating point</u>)
> **principle** – stores the initial principle P (<u>floating point</u>)
> **RATE_HIGH** – stores the high interest rate r (5.75%) (<u>constant</u>)
> **RATE_LOW** – stores the low interest rate r (3.5%) (<u>constant</u>)
> **time** – stores the time in days (<u>integer</u>)
> **years** – stores the time t in years (<u>floating point</u>)
> **choice** – stores the choice of your interest rate (<u>integer</u>)

If you execute the program with the following underlined inputs, the results will be:

> ~> **hw14.o**
> Enter principle: **4500.00**
> Enter time (in days): **300**
> Enter interest rate (1 for high rate, 2 for low rate): **x**
>
> Invalid Interest Rate
> ~> **hw14.o**
> Enter principle: **4500.00**
> Enter time (in days): **300**
> Enter interest rate (1 for high rate, 2 for low rate): **2**
>
> In 0.82 years, the simple interest earned is: $129.45
> ~>

When you have double checked your work, submit your program to the grader program. Use the back page for your Algorithmic Development. This should include your I/O diagram, and pseudocode.

Highlight your code from **HW15**, and copy it using **Ctrl-C**. Then close your project, create a new project called **HW16**, and create a **hw16.c** source file. Then hit **Ctrl-V** to copy the old **hw15.c** code into **hw16.c**.

Edit the first line of **hw16.c** that it includes **/* homework 16 */**.

Write a program that calculates the amount of simple interest earned based upon the principle, **a range of interest rates**, and time. **Prompt the user for a starting rate (in percent), an ending rate (in percent), and an increment, and calculate and print the interest in tabular form based upon your values.**

Specifications:
Use similar specifications as before, but remove your two constants and the variable choice, and add the following variables instead:

> **low_rate** – stores the starting interest rate as a percentage (<u>floating point</u>)
> **high_rate** – stores the ending interest rate as a percentage (<u>floating point</u>)
> **increment** – stores the increment as a percentage for the interest rate (<u>floating point</u>)
> **rate** – stores the current interest rate as a percentage (<u>floating point</u>)

You no longer need an if-else statement, but you now need a while loop to solve the problem.

If you execute the program with the following underlined inputs, the results will be:

```
~> hw15.o
Enter principle: 4500.00
Enter time (in days): 300
Enter low interest rate: 1
Enter high interest rate: 5.75
Enter increment: 1.1

Interest Computations
Rate     Interest
1.00     $36.99
2.10     $77.67
3.20     $118.36
4.30     $159.04
5.40     $199.73
~>
```

When you have double checked your work, submit your program to the grader program. Use the back page for your Algorithmic Development. This should include your I/O diagram, and pseudocode.