CSE 105(6): Structured Programming

Programming Assignments

- You must submit the assignment in a **handwritten** form. You should also enclose a cover page mentioning your name, student ID, section number, course number, course instructor and date of submission.
- **The deadline to submit the assignment is 16 November 2014.**
- There will be a **VIVA examination** regarding this assignment. The date will be notified later.
- **Do not cheat by copying others assignment.**

Problem 1 (Gas Mileage):

Drivers are concerned with the mileage obtained by their automobiles. One driver has kept track of several tankfuls of gasoline by recording miles driven and gallons used for each tankful. Develop a program that will input the miles driven and gallons used for each tankful.

The program should calculate and display the miles per gallon obtained for each tankful. After processing all input information, the program should calculate and print the combined miles per gallon obtained for all tankfuls. Here is a sample input/output dialog:

```
Enter the gallons used (-1 to end): 12.8
Enter the miles driven: 287
The miles / gallon for this tank was 22.421875

Enter the gallons used (-1 to end): 10.3
Enter the miles driven: 200
The miles / gallon for this tank was 19.417475

Enter the gallons used (-1 to end): 5
Enter the miles driven: 120
The miles / gallon for this tank was 24.000000

Enter the gallons used (-1 to end): -1

The overall average miles/gallon was 21.601423
```

Problem 2 (Sales Commission Calculator)

One large chemical company pays its salespeople on a commission basis. The salespeople receive $200 per week plus 9% of their gross sales for that week. For example, a salesperson who sells $5000 worth of chemicals in a week receives $200 plus 9% of $5000, or a total of $650.

Develop a program that will input each salesperson's gross sales for last week and will calculate and display that salesperson's earnings. Process one salesperson's figures at a time. Here is a sample input/output dialog:

```
Enter sales in dollars (-1 to end): 5000.00
Salary is: $650.00

Enter sales in dollars (-1 to end): 1234.56
Salary is: $311.11

Enter sales in dollars (-1 to end): 1088.89
Salary is: $298.00

Enter sales in dollars (-1 to end): -1
```

Problem 3 (Credit Limit Calculator)

Develop a C program that will determine if a department store customer has exceeded the credit limit on a charge account. For each customer, the following facts are available:

a) Account number
b) Balance at the beginning of the month
c) Total of all items charged by this customer this month
d) Total of all credits applied to this customer's account this month
e) Allowed credit limit

The program should input each of these facts, calculate the new balance (= beginning balance + charges – credits), and determine if the new balance exceeds the customer's credit limit. For those customers whose credit limit is exceeded, the program should display the customer's account number, credit limit, new balance and the message "Credit limit exceeded." Here is a sample input/output dialog:

```
Enter account number (-1 to end): 100
Enter beginning balance: 5394.78
Enter total charges: 1000.00
Enter total credits: 500.00
Enter credit limit: 5500.00
Account:      100
Credit limit: 5500.00
Balance:      5894.78
Credit Limit Exceeded.

Enter account number (-1 to end): 200
Enter beginning balance: 1000.00
Enter total charges: 123.45
Enter total credits: 321.00
Enter credit limit: 1500.00

Enter account number (-1 to end): 300
Enter beginning balance: 500.00
Enter total charges: 274.73
Enter total credits: 100.00
Enter credit limit: 800.00

Enter account number (-1 to end): -1
```

Problem 4 (Salary Calculator)

Develop a program that will determine the gross pay for each of several employees. The company pays "straight time" for the first 40 hours worked by each employee and pays "time-and-a-half" for all hours worked in excess of 40 hours. You're given a list of the employees of the company, the number of hours each employee worked last week and the hourly rate of each employee.

Your program should input this information for each employee, and should determine and display the employee's gross pay. Here is a sample input/output dialog:

```
Enter # of hours worked (-1 to end): 39
Enter hourly rate of the worker ($00.00): 10.00
Salary is $390.00

Enter # of hours worked (-1 to end): 40
Enter hourly rate of the worker ($00.00): 10.00
Salary is $400.00

Enter # of hours worked (-1 to end): 41
Enter hourly rate of the worker ($00.00): 10.00
Salary is $415.00

Enter # of hours worked (-1 to end): -1
```

Problem 5 (Interest Calculator)

The simple interest on a loan is calculated by the formula

```
interest = principal * rate * days / 365;
```

The preceding formula assumes that rate is the annual interest rate, and therefore includes the division by 365 (days). Develop a program that will input principal, rate and days for several loans, and will calculate and display the simple interest for each loan, using the preceding formula. Here is a sample input/output dialog:

```
Enter loan principal (-1 to end): 1000.00
Enter interest rate: .1
Enter term of the loan in days: 365
The interest charge is $100.00

Enter loan principal (-1 to end): 1000.00
Enter interest rate: .08375
Enter term of the loan in days: 224
The interest charge is $51.40

Enter loan principal (-1 to end): 10000.00
Enter interest rate: .09
Enter term of the loan in days: 1460
The interest charge is $3600.00

Enter loan principal (-1 to end): -1
```

Problem 6 (Find the Largest Number)

The process of finding the largest number (i.e., the maximum of a group of numbers) is used frequently in computer applications. For example, a program that determines the winner of a sales contest would input the number of units sold by each salesperson. The salesperson who sold the most units wins the contest. Write a program that inputs a series of 10 numbers and determines and prints the largest of the numbers.
[Hint: Your program should use three variables as follows]:
counter: A counter to count to 10 (i.e., to keep track of how many numbers have been input and to determine when all 10 numbers have been processed)
number: The current number input to the program
largest: The largest number found so far

Problem 7 (Palindrome Tester)

A palindrome is a number or a text phrase that reads the same backward as forward. For example, each of the following five-digit integers is a palindrome: 12321, 55555, 45554 and 11611.
Write a program that reads in a five-digit integer and determines whether or not it's a palindrome. [*Hint*: Use the division and remainder operators to separate the number into its individual digits.]

Problem 8 (Sides of a Triangle) Write a program that reads three nonzero float values and determines and prints if they could represent the sides of a triangle.

Problem 9 (Sides of a Right Triangle) Write a program that reads three nonzero integers and determines and prints if they could be the sides of a right triangle.

Problem 10 (Factorial)

The factorial of a nonnegative integer n is written $n!$ (pronounced "n factorial") and is defined as follows:
$n! = n \cdot (n - 1) \cdot (n - 2) \cdot \ldots \cdot 1$ (for values of n greater than or equal to 1) and $n! = 1$ (for $n = 0$).
For example, $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$, which is 120.
Write a program that reads a nonnegative integer and computes and prints its factorial.