Introduction to Programming Practice Problems (Midterm)

1. Write a program that calculates your daily driving cost, so that you can estimate how much money could be saved by car-sharing, which also has other advantages such as reducing carbon emissions and reducing traffic congestion. The program should input the following information and display the user's cost per day of driving to work:
    a) Total kilometers driven per day.
    b) Cost per liter of petrol.
    c) Average kilometer per liter.
    d) Parking fees per day.
    e) Tolls per day
2. Create a BMI calculator program that reads the user's weight in kilogram and height in meter. Then calculates and displays the user's body mass index.
3. Write a program that reads an integer and determines and prints whether it's odd or even. [Hint: Use the modulus operator. An even number is a multiple of two. Any multiple of two leaves a remainder of zero when divided by 2.
4. Write a program that reads in two integers and determines and prints if the first is a multiple of the second. [Hint: Use the modulus operator.]
5. Using a for/while loop, write a program that shows the sum of 1 of 10.
6. Develop a C++ program that will determine whether a department-store customer has exceeded the credit limit on a charge account. For each customer, the following facts are available:
    a) Account number (an integer)
    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 use a while statement to input each of these facts, calculate the new balance (= beginning balance + charges – credits) and determine whether 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".

7. A large company pays its salespeople on a commission basis. The salespeople each receive 2000 BDT per week plus 9% of their gross sales for that week. For example, a salesperson who sells 15000 worth of chemicals in a week receives 2000 plus 9% of 15000 BDT. Develop a program that uses a **while/for** statement to input five salesperson's gross sales for last week and calculates and displays five salesperson's earnings.
8. Write a program that estimates the value of the mathematical constant **e** by using the formula:
9. $$e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \dots$$
10. Input an integer containing only 0s and 1s (i.e., a "binary" integer) and print its decimal equivalent. Use the modulus and division operators to pick off the "binary" number's digits one at a time from right to left. Much as in the decimal number system, where the rightmost digit has a positional value of 1, the next digit left has a positional value of 10, then 100, then 1000, and so on, in the binary number system the rightmost digit has a positional value of 1, the next digit left has a positional value of 2, then 4, then 8, and so on. Thus, the decimal number 234 can be interpreted as 2 * 100 + 3 * 10 + 4 * 1. The decimal equivalent of binary 1101 is 1 * 1 + 0 * 2 + 1 * 4 + 1 * 8 or 1 + 0 + 4 + 8, or 13.
11. A mail order house sells five different products whose retail prices are: product 1 — BDT 200.75, product 2—345.50, product 3— BDT 775.75, product 4— BDT 400.35 and product 5— BDT 1200.75. Write a program that reads a series of pairs of numbers as follows:
    a. product number;
    b. quantity sold.

    Your program should use a **switch** statement to determine the retail price for each product. Your program should calculate and display the total retail value of all products sold.

12. A parking garage charges a BDT 20.00 minimum fee to park for up to three hours. The garage charges an additional BDT 5.50 per hour for each hour in excess of three hours. The maximum charge for any given 24-hour period is BDT 1000.00. Assume that no car parks for longer than 24 hours at a time. Write a program that calculates and prints the parking charges for each of three customers who parked their cars in this garage yesterday. You should enter the hours parked for each customer. Your program should print the results in a tabular format and should calculate

and print the total of yesterday's receipts. The program should use the function ***calculateCharges*** to determine the charge for each customer.

13. Implement the following integer functions:
    - Function ***celsius*** returns the Celsius equivalent of a Fahrenheit temperature.
    - Function **fahrenheit** returns the Fahrenheit equivalent of a Celsius temperature.
    - Use these functions to write a program that prints charts showing the Fahrenheit equivalents of all Celsius temperatures from 0 to 100 degrees, and the Celsius equivalents of all Fahrenheit temperatures from 32 to 212 degrees. Print the outputs.
14. Write single statements that perform the following one-dimensional array operations:
    - Initialize the 10 elements of integer array counts to zero.
    - Add 1 to each of the 15 elements of integer array bonus.
    - Read 12 values for double array monthlyTemperatures from the keyboard.
    - Print the 5 v
15. A small airline has just purchased a computer for its new automated reservations system. You've been asked to program the new system. You are to write a program to assign seats on each flight of the airline's only plane (capacity: 10 seats). Your program should display the following menu of alternatives—Please type 1 for "First Class" and Please type 2 for "Economy". If the person types 1, your program should assign a seat in the first-class section (seats 1–5). If the person types 2, your program should assign a seat in the economy section (seats 6–10). Your program should print a boarding pass indicating the person's seat number and whether it's in the first class or economy section of the plane. Use a one-dimensional array to represent the seating chart of the plane. Initialize all the elements of the array to 0 to indicate that all seats are empty. As each seat is assigned, set the corresponding elements of the array to true to indicate that the seat is no longer available. Your program should, of course, never assign a seat that has already been assigned. When the first-class section is full, your program should ask the person if it's acceptable to be placed in the economy section (and vice versa). If yes, then make the appropriate seat assignment. If no, then print the message "Next flight leaves in 3 hours.

16. For each of the following, write C++ statements that perform the specified task. Assume that unsigned integers are stored in two bytes and that the starting address of the array is at location 1002500 in memory.
    - Declare an array of type unsigned int called values with five elements and initialize the elements to the even integers from 2 to 10. Assume that the symbolic constant SIZE has been defined as 5.
    - Declare a pointer vPtr that points to an object of type unsigned int.
    - Use a for statement to print the elements of array values using array subscript notation.
    - Write two separate statements that assign the starting address of array values to pointer variable vPtr.
    - Use a for statement to print the elements of array values using pointer/offset notation.
    - Use a for statement to print the elements of array values using pointer/offset notation with the array name as the pointer.
    - Use a for statement to print the elements of array values by subscripting the pointer to the array.
    - Refer to the fifth element of values using array subscript notation, pointer/offset notation with the array name as the pointer, pointer subscript notation and pointer/offset notation.
    - What address is referenced by vPtr + 3? What value is stored at that location?
    - Assuming that vPtr points to values[4], what address is referenced by vPtr -= 4?
    - What value is stored at that location?