Assignment 5_1:
Due 9:00 AM Thursday April 9 2009
Submit: file zip of your source code.

Objectives: In this assignment, you familiarize yourself with writing & using methods.

Note: You can discuss the assignment with your friends or your tutor but you have to complete by yourself. Copying other’s work is not permitted and you will get F grade.

1. (30 points). Diameter of a number. Diameter of a natural number is the difference between the largest and the smallest digit in that number. For example, the diameter of 1567397 is (9-1) = 8. Write a method public static int diameter(int n) that returns the diameter of a natural number. Demonstrate this method in the main() method.

Hint: Use method String.valueOf() to convert a number to string, substring(), and Integer.parseInt().

2. (25 points). Write a method public static int convertToNumber(char c) that returns the suitable number for the inputed char c using the table below:

<table>
<thead>
<tr>
<th></th>
<th>DEF</th>
<th>GHI</th>
<th>JKL</th>
<th>MNO</th>
<th>PQRS</th>
<th>TUV</th>
<th>WXYZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 1

Example:
- convertToNumber(‘A’) return 2
- convertToNumber(‘Q’) return 7
- convertToNumber(‘Z’) return 9

Hint: Use switch statement.

3. (20 points). Any 7-letter string can be converted to a number using 7 corresponding digits on a mobile phone or home phone. For example, string “THEBOSS” can be converted to number 8432677, string “THEKING” can be converted to number 8435464, and string “DARLING” can be converted to number 3275464. The table 1 above shows the way of this conversion, as it appears on your home phones and mobile phones.

Write a program that reads a 7-letter string, validate the input, and if the input is valid, displays the corresponding phone number. Your codes in main() method must use convertToNumber() method that you implemented in exercise 2.

Hint: Get the length of string. Use a loop, and method charAt() of string object.
Sample run 1:
Enter a 7-letter string: THEKING
The phone number is 8435464

Sample run 2:
Enter a 7-letter string: TH55ING
Invalid data!

4. (25 pts) The loan officer at one of the Central Mountain Credit Union’s branch offices has asked you to write a loan amortization application to run on her desktop PC. The application should allow the user to enter the amount of a loan, the number of years of the loan, and the annual interest rate, and then the application will display the monthly payment of loan. The credit union uses following formula to calculate the monthly payment of loan:

The credit union uses the following formula to calculate the monthly payment of a loan:

\[
Payment = \frac{Loan \times \frac{Rate}{12} \times Term}{Term - 1}
\]

where: 
- \( Loan \) = the amount of the loan,
- \( Rate \) = the annual interest rate, and
- \( Term = (1 + \frac{Rate}{12})^{Years \times 12} \)

Requirements:

1. The program calls the following method, which have not been written:
   - getLoanYears(): this method should ask the user to enter the number of years for the loan, and then return that value as a int.
   - getLoanAmount(): this method should ask the user to enter the amount of loan, and then return that value as double.
   - getInterestRate(): this method should ask the user to enter the annual interest rate, and then return that value as double.
   - getTerm(double interestRate, int loanYears): this method is used to calculate the term.
   - calculatePayment(int loanYears, double loanAmount, double interestRate): this method is used to calculate the monthly payment amount.

2. The number of years for the loan, the amount of loan and the annual interest rate must be positive number.