CECS 174 – Homework 4 Due date: Mar 18th, 2015 @ 11:59 pm

1. Write a program that computes taxes for the following schedule.

If your status is Single and if the taxable income is over	but not over	the tax is	of the amount over
$0	$8,000	10%	$0
$8,000	$32,000	$800+15%	$8,000
$32,000		$4,400+25%	$32,000
If your status is Married and if the taxable income is over	but not over	the tax is	of the amount over
$0	$16,000	10%	$0
$16,000	$64,000	$1,600+15%	$8,000
$64,000		$8,800+25%	$32,000

2. A year with 366 days is called a leap year. Leap years are necessary to keep the calendar synchronized with the sun because the earth revolves around the sun once every 365.25 days. Actually, that figure is not entirely precise, and for all dates after 1582 the Gregorian correction applies. Usually years that are divisible by 4 are leap years, for example 1996. However, years that are divisible by 100 (for example, 1900) are not leap years, but years that are divisible by 400 are leap years (for example, 2000). Write a program that asks the user for a year and computes whether that year is a leap year. Provide a class **`Year`** with a method **`isLeapYear`**. Use a single `if` statement and Boolean operators. Write **`LeapYearTester`** class to test your method.

3. Write a program to simulate a bank transaction. There are two bank accounts: checking and savings. First, ask for the initial balances of the bank accounts; reject negative balances. Then ask for the transactions, options are deposit, withdrawal, and transfer. Then ask for the account; options are checking and savings. Reject transactions that overdraw an account. At the end, print the balances of both accounts.

4. *Unit conversion.* Write a unit conversion program that asks the users from which unit they want to convert (fl.oz, gal, oz, lb, in, ft, mi) and to which unit they want to convert (ml, l, g, kg, mm, cm, m, km). Reject incompatible conversions (such as gal to km). Ask for the value to be converted, then display the result:

```
Convert from? gal
Convert to? ml
Value? 2.5
2.5 gal = 9462.5 ml
```

5. *Roman numbers*. Write a program that converts a positive integer into the Roman number system. The Roman number system has digits

I	1
V	5
X	10
L	50
C	100
D	500
M	1000

Numbers are formed according to the following rules:
a. Only numbers up to 3,999 are represented
b. As in the decimal system, the thousands, hundreds, tens, and ones are expressed separately.
c. The number 1 to 9 are expressed as

I	1	VI	6
II	2	VII	7
III	3	VIII	8
IV	4	IX	9
V	5		

As you can see, an I preceding a V or X is subtracted from the value, and you can never have more than three I's in a row.
d. Tens and hundreds are done the same way, except that the letters X, L, C and C, D, M, are used instead of I, V, X respectively. (E.g. CM is 900, XL is 40, LXXX is 80, DC is 60).
Your program should take an input, such as **1978**, and convert it to Roman numerals, **MCMLXXVIII**

6. A minivan has two sliding doors. Each door can be opened by either a dashboard switch, its inside handle, or its outside handle. However, the inside handles do not work if a child lock switch is activated. In order for the sliding doors to open, the gear shift must be in park, and the master unlock switch must be activated. Your task is to simulate a portion of the control software for the vehicle. The input is a sequence of values for the switches and the gear shift, in the following order:

- Dashboard switches for left and right sliding door, child lock, and master unlock (0 for off or 1 for activated)
- Inside and outside handles on the left and right sliding doors (0 or 1)
- The gear shift setting (one of P N D 1 2 3 R).

A typical input would be **0 0 0 1 0 1 0 0 P** (means, switch for left door OFF, switch for right door ON, child lock OFF, master unlock ON, inside handle for left door OFF, outside handle for left door ON, inside handle for right door OFF, outside handle for right door OFF, the hear shift P)
Print "left door opens" and/or "right door opens" as appropriate. If nether door opens, print "both doors stay closed".