Subject: PRF192- PFC
Workshop 02

Objectives:
   Practicing skills at analyzing and implementing simple programs

Contents: 7 programs

Program	1	2	3	4	5	6	7
Mark	**2**	**2**	**1**	**1**	**2**	**1**	**1**

Program 1 (2 marks)

Write a program that allows user inputting a simple expression containing one of four
operators +, -, *, / then the result is printed out to the monitor. Input format: num1
operator num2,
An example of user interface
Enter an expression (+ - * /): 4*5
Result: 20

Sample Analysis

	Content	Implementation
Nouns	Expression, format num1 operator num2 result	double num1, num2 char op double result

Verbs	Begin
	Accept num1, op, num2
	Calculate result
	Print out result
	End
		scanf("%lf%c%lf", &num1, &op, &num2)
		switch (op)
		        { case '+' : result = num1 + num2;
		                        print out result;
		                        break;
		                case '-' : result = num1 - num2;
		                        print out result;
		                        break;
		                case '*' : result = num1 * num2;
		                        print out result;
		                        break;
		            case '/' : if (num2==0)
		                        print out "Divide by 0 "
		                    else
		                    { result = num1 / num2;
		                        print out result;
		                    }

		break; default: print out "Op is not supported" }

Implement this program.

Program 2 (2 marks) – Yearly Personal Income Tax

Suppose that:
In Viet Nam, each people has to pay for his/her yearly personal income tax as the following description:

Rules:

Tax-free income:
Personal pending amount (tiền nuôi bản thân) **pa=** 9 000 000$/month
Alimony (tiền cấp dưỡng) for each his/her dependent **pd=** 3 600 000$/month/dependent
With **n** dependents, Yearly tax-free income: **tf = 12*(pa + n*pd)**

Taxable income (thu nhập chịu thuế)
ti = income – tf
(If ti<=0 then income tax = 0)

Based on taxable income, the employee has to pay his/her income tax with levels pre-defined in the following table:

Level	Taxable Income	Income tax
1	Less than or equal to 5.000.000	5%
2	From 5.000.001 to 10.000.000	10%
3	From 10.000.001 to 18.000.000	15%
4	Over 18.000.000	20%

Write a program which will compute income tax of a people using the following interface:

Case 1:

Your income of this year: 240000000
Number of dependent:4
Tax-free income: 280800000
Taxable income: 0

Income tax: 0

Case 1:

Your income of this year: 440000000
Number of dependent:4
Tax-free income: 280800000
Taxable income:: 159200000
Income tax: 30190000

Program 3 (1 mark)

Objectives	Practice loop statements
Related knowledge	None
Problem	Write a C program that will print out **sum** of **integers** inputted from the keyboard until the value 0 is inputted.

Analysis
Nouns: sum → int S;
Accepted integral value → int x
	Suggested algorithm (logical order of verbs)
	Begin
	    S=0;
	    Do {
	       Accept x;
	       If (x != 0) S = S + x;
	    }
	    While (x!=0);
	    Print out S;
	End

Program 4 (1 mark)

Objectives	Practice loops statement
Related knowledge	None
Problem	Write a C program that will carry out some times: accept two integers, swap these values, print them out to the monitor. The program will terminate when the value of 0 is inputted.

Analysis
Nouns:
2 integers → int x, y;
	Suggested algorithm (logical order of verbs)
	Begin
	    Do {
	        Accept x, y;
	        int t= x; /* t: temporary variable */
	        x= y;
	        y= t;
	        Print out x, y;
	    }
	    While (x!=0 && y!=0);

	End

Program 5: (2 marks)

Related knowledge	Use the function **getchar()** –stdio.h, to input a character, the function **toupper(ch)** to convert a character to uppercase - **ctype.h** ASCII code of the ENTER key: '\n'
Problem	Write a C program that will: - permit user inputting a string of characters. The input operation will terminate if the ENTER key is stroked. - print out the number of vowels, number of consonants, and number of others to the monitor.

Analysis
Nouns:
inputted character
→ char ch
Number of vowels
→ int nVowels =0;
Number of consonants
→ int consonants =0;
Number of other characters → int nOthers =0;
	Suggested algorithm (logical order of verbs)
	Begin
	  Do {
	     Accept ch; /* ch= getchar(); */
	     Convert ch to its uppercase /* ch= toupper(ch); */
	     If (ch>='A' and ch <='Z') {
	       switch (ch) {
	         case 'A' :
	         case 'E' :
	         case 'I' :
	         case 'O' :
	         case 'U' : nVowels ++; break;
	         default: nConsonants++;
	       }
	     }
	     else nOthers = nOthers++;
	  }
	  While (ch != '\n');
	  Print out nVowels;
	  Print out nConsonants;
	  Print out nOthers;
	End

Program 6: (1 marks)

Related knowledge	Each character will be stored as its ASCII code with value 0..255
Problem	Write a C program that will print out the ASCII code table.
Analysis ASCII code → int code	**Suggested algorithm (logical order of verbs)** Begin For each code = 0 to 255

	{ Print out ("%c : %d, %o, %X\n", code, code, code, code);
	    If (code !=0 && code %20==0) getchar(); /* **code page of 20 lines** */
	}
	End.

Program 7: (1 marks)

Problem	Write a C program that will accept two characters then print out ASCII code difference between them and characters between them including code values in decimal, octal, hexadecimal expansions in ascending order.

Analysis
2 character
→ char c1, c2
Difference
→ int d;
Character for swapping operation
→ char t
Character for looping
➔ Char c
	Suggested algorithm (logical order of verbs)
	Begin
	    Accept c1 ;;
	    Accept c2;
	    If (c1 > c2)
	    { t = c1; c1 = c2; c2= t;
	    }
	    d = c2 – c1;
	    Print out d;
	    For each c from c1 to c2
	    { Print out ("%c : %d, %o, %X\n", c, c, c, c);
	    }
	End.

END