

## 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
<b>Nouns</b>	Expression, format num1 operator num2  result	double num1, num2 char op double result
<b>Verbs</b>	Begin Accept num1, op, num2 <b>Calculate result</b> 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" }
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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:**

<b>Level</b>	<b>Taxable Income</b>	<b>Income tax</b>
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)

<b>Objectives</b>	Practice loop statements
<b>Related knowledge</b>	None
<b>Problem</b>	Write a C program that will print out <b>sum</b> of <b>integers</b> inputted from the keyboard until the value 0 is inputted.
<b>Analysis</b> <i>Nouns: sum → int S; Accepted integral value → int x</i>	<b>Suggested algorithm (logical order of verbs)</b> Begin S=0; Do { Accept x; If (x != 0) S = S + x; } While (x!=0); Print out S; End

### Program 4 (1 mark)

<b>Objectives</b>	Practice loops statement
<b>Related knowledge</b>	None
<b>Problem</b>	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.
<b>Analysis</b> <i>Nouns: 2 integers → int x, y;</i>	<b>Suggested algorithm (logical order of verbs)</b> 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
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### Program 5: (2 marks)

<b>Related knowledge</b>	Use the function <b>getchar()</b> –stdio.h, to input a character, the function <b>toupper(ch)</b> to convert a character to uppercase - <b>ctype.h</b> ASCII code of the ENTER key: '\n'
<b>Problem</b>	Write a C program that will: <ul style="list-style-type: none"> <li>- permit user inputting a string of characters. The input operation will terminate if the ENTER key is stroked.</li> <li>- print out the number of vowels, number of consonants, and number of others to the monitor.</li> </ul>
<b>Analysis</b> Nouns: inputted character → char ch Number of vowels → int nVowels =0; Number of consonants → int consonants =0; Number of other characters → int nOthers =0;	<b>Suggested algorithm (logical order of verbs)</b> Begin Do { Accept ch; /* ch= getchar(); */ Convert ch to its uppercase /* ch= toupper(ch); */ If (ch>='A' && ch <='Z') { switch (ch) { case 'A' : case 'E' : case 'I' : case 'O' : case 'U' : nVowels ++; break; default: nConsonants++; } } else if (ch!=10) nOthers++; } While ( ch != '\n'); Print out nVowels; Print out nConsonants; Print out nOthers; End

### Program 6: (1 marks)

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

	<pre> {   Print out ("%c : %d, %o, %X\n", code, code, code, code);     If (code !=0 &amp;&amp; code %20==0) getchar(); /* code page of 20 lines */ } End. </pre>
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**Program 7: (1 marks)**

<b>Problem</b>	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.
<b>Analysis</b> 2 character → char c1, c2 Difference → int d; Character for swapping operation → char t Character for looping → Char c	<b>Suggested algorithm (logical order of verbs)</b> 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**