

Subject: PRF192- PFC

Workshop 03

Objectives:

- Practicing skills at analyzing and implementing the C programs
- Practicing and implementing programs using user-defined functions.
- Implementing programs using recursive functions.

Program 1 (1 marks)

Objectives	Practice implementing loop and print functions
Related knowledge	
Problem	<p>Write a program that input an integer N (not more than 100) as the length of the side of the parallelogram. Print out the corresponding parallelogram according to the pattern in the example.</p> <p>Input: 5</p> <p>Output:</p> <pre>~~~~***** ~~~***** ~~***** ~***** *****</pre>

Program 2 (1.5 marks)

Objectives	Practice implementing loop and print functions
Related knowledge	
Problem	<p>Write a program to check if an inputted number (not more than 6 digits) has the property that the sum of its digits is divisible by 10.</p> <p>Example:</p> <p>Input: 3333 Output: NO</p> <p>Input: 555555 Output: YES</p> <p>Input: 123455 Output: YES</p>
Analysis	Suggested algorithm (logical order of verbs)

<i>Nouns: positive long integer → int n</i>	<pre> Begin Do { Accept n; } While (n<1 n>1000000); While (n > 0) { tong = tong + (n mod 10) n = n chia 10 lay nguyen } If tong chia het 10 then In ra YES Else In ra NO End </pre>
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Program 3 (1.5 marks)

Objectives	Practice implementing functions
Related knowledge	A prime is positive integer that is greater than 1 and it is the multiple of 1 and itself only. Theorem: The integer n is a prime if and only if n>1 and it can not be divided by all integers from 2 to square root of n. Use the library math.h to get the function sqrt(double) for getting the square root of a positive number.
Problem	Write a C program that will: <ul style="list-style-type: none"> - permit user inputting a positive integer n, n>=2 - print out primes between 2 and n
Analysis <i>Nouns: positive integer → int n</i>	Suggested algorithm (logical order of verbs) <pre> Begin Do { Accept n; } While (n<2); For (i=2 to n) If (i is a prime) Print out i; // Function check prime End </pre>

Program 4 (1.5 marks)

Objectives	Practice implementing functions
Related knowledge	A point p is in a circle if the distance from the center to p is less than the radius.
Problem	Write a C program that will accept a point and a circle having the center is (0,0) then print out the relative position of this point with the circle
Analysis <i>Nouns:</i> A point → double x,y A circle → double r	Suggested algorithm (logical order of verbs) <pre> Begin Accept x, y; Do { </pre>

Relative position int result -1: (x,y) is out of the circle 0: (x,y) is on the circle 1: (x,y) is in the circle	Accept r; } While(r<0); result = getRelPos(x,y,r); if (result ==1) Print out "The point is in the circle"; else if (result==0) Print out "The point is on the circle"; else Print out "The point is out of the circle"; End
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Program 5 (1.5 marks)

Objectives	Practice implementing functions
Related knowledge	The factorial of a integer is defined that: $n! = 1*2*3*...*n$
Problem	Write a C program that will accept a positive integer then print out its factorial
Analysis Nouns: positive integer → int n	Suggested algorithm (logical order of verbs) Int factorial(n) { fact bang 1 for (c = 1; c nho hon bang n; c++) fact = fact nhan c; return fact; } Begin Do { Accept n; } While (n<0); Print out factorial(n); End.

Program 6 (1.5 marks)

Objectives	Practice implementing functions
Related knowledge	A perfect number is a number whose sum of divisors (smaller than itself) is equal to it. For example: $6 = 1 + 2 + 3$.
Problem	Write a C program that allows to input the number n (no more than 6 digits) and enumerate the perfect numbers less than n.
Analysis Nouns: positive integer → int n	Suggested algorithm (logical order of verbs) Char isPerfectNumber (n) { TongUS bang 0 for (c = 1; c nho hon bang n/2; c++) if (l la uoc n) TongUS = TongUS cong c; return TongUS == n; } Begin

	<pre> Do { Accept n; } While (n<0); Print out isPerfectNumber (n); End.</pre>
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Program 7 (1.5 marks)

Objectives	Practice Recursive functions
Related knowledge	Greatest Common Divisor (GCD) of 2 integers a and b is the largest integer d satisfy all a and b are divisible by d
Problem	Write a C program which can find out the greatest common divisor (gcd) of two positive integers. The program loop until the user input both of a and b equal zero.
Analysis <i>Nouns: positive integer</i> → int a, b <i>Stop when a = 0, b = 0</i>	Suggested algorithm (logical order of verbs) <pre> int gcd(int a, int b) { Neu (b bang 0) return a; return gcd(b, a % b); // Recursive Function } Begin Do { Accept a, b; Print out gcd (n); } While (a khac 0 and b khac 0); End.</pre>