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ECE 120 Worksheet 3: Problem Solving with C

As an engineer, you will often need to write programs to help you perform computations that cannot easily be done by hand. Typically, such calculations are expressed as complex mathematical formulae that need to be translated into a programming language. In this discussion, you will explore how various mathematical formulae can be translated to C constructs. As a reminder, there are only three basic programming constructs: *sequential, conditional, and iterative*.

1. The Sequential Construct

In a sequential construct, statements are executed sequentially. Use a sequential construct to solve the following problem: compute the total area of two non-intersecting circles of radii r_1 and r_2.

1. Write equations for circle areas S_1 and S_2 as functions of their radii:

   $S_1 = \pi r_1^2$

   $S_2 = \pi r_2^2$

2. Translate these equations into C program statements (do not forget to properly use C operators, such as +, *, and so forth).

```
float r1, r2;   /* radii */

float S1, S2;   /* areas */

float S_total;  /* total area of two circles*/


S1 = 3.1415 * r1 * r1;


S2 = 3.1415 * r2 * r2;


S_total = S1 + S2;
```
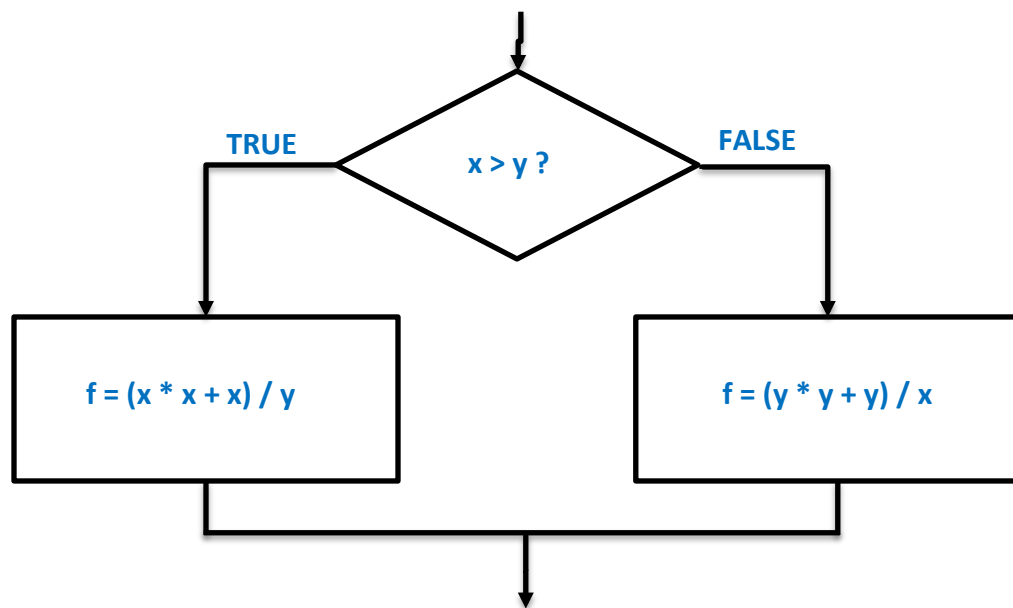
2. Conditional Construct

A conditional construct enables execution to depend on a condition, which in C means the value of an expression. Remember that in C, a value of 0 is considered to be false, while any non-zero value is considered to be true. Translate the following mathematical equation into a C program using a conditional construct:

$$f(x,y) = \begin{cases} \dfrac{x^2 + x}{y} & if \ x > y \\ \dfrac{y^2 + y}{x} & otherwise \end{cases}$$

1. First, fill in a flowchart.

2. Next, translate your flowchart into a C program fragment. Assume that *x* and *y* contain meaningful values before your conditional construct executes.

```
float x, y;   /* arguments */

float f;      /* function */

if (x > y) {

    f = (x * x + x) / y;

} else {

    f = (y * y + y) / x;

}
```

3. Your first C program

Write a program which asks user to enter three numbers and then finds and prints the largest number among three numbers entered by user.

```c
#include <stdio.h>

int main()

{

    float a, b, c;

    float max;


    printf("Enter 3 numbers: ");

    scanf("%f %f %f", &a, &b, &c);


    if (a > b) max = a;

    else max = b;


    if (c > max) max = c;


    printf("Largest number is %f\n", max);


    return 0;

}
```