

**CS111 – Introduction to C Programming  
(Draft)**

**Fall 2025**

**Programming Assignment #3 (2%)**

**Due: Friday September 26, 2025 (23:59)**

**Formatted Input and Output, Arithmetic Operations Among Floating Point Numbers**

## **Objectives**

- Read variables into a C program with formatted input function **scanf( )**.
- Perform arithmetic calculations among the variables.
- Use of two library functions: **sizeof ( )** and **sqrt( )**.

## **Part I: Sizes of C Variable Types**

The following is a C program that prints out the size of a float variable where **sizeof ( )** is a C function that returns the size in bytes of its input variable. Revise it so that you can print out the sizes of six C variable types: **char**, **int**, **short**, **long**, **float**, and **double**.

```
#include <stdio.h>

int main()
{
    int n;
    float x;

    n = sizeof(x);
    printf("Size of a C float is: %d (bytes).\n", n);
}
```

Note the sizes of the variables must be calculated with the function **sizeof ( )** and cannot be hard-coded. Name your source file for this part as **pa3p1.c** and submit it.

## **Part II: Circle perimeter and area calculation**

Write C program that first prompts the user to input a value representing the radius of a circle. It should then read the input value with **scanf( )** and print out with **printf( )** the perimeter and the area of the circle. Define a constant for  $\pi$  with the compiler directive **# define** with a value of 3.1415926 and use the constant in the calculation of the perimeter and area values. Use meaningful names for the variables and insert line comments throughout the program to explain your code. All calculations should be done with floating point operations. On output, use the

forming string to provide a clear description of what the values represent. Name the source file for this part as **pa3p2.c** and submit it.

## Part II: Triangle area calculation

Write a program that prompts a user to provide the lengths of three sides of a triangle with a meaningful message, reads the three values into three float variables named a, b, and c, calculates the area of the triangle using Heron's formula, and finally outputs its area,. The Heron's formula to calculate the area of a triangle is:

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)} \text{ where } s = (a+b+c)/2.$$

The square root in C can be computed with the function **sqrt( )**, which can be called after including the **math.h** as a compiler directive. The following C example shows how to use **sqrt( )** to calculate the square root of **x**.

```
#include <stdio.h>
#include <math.h>

int main() {
    float x, xsqrt;

    x = 5.0; xsqrt = sqrt(x);
    printf("Square root of %f is %f.\n", x, xsqrt);
}
```

Test your program using only the valid values of a, b and c; i.e., they must be such that the sum of the smallest two is greater than the third such as:

1. a = 1.5 , b = 2.5 , c = 3;
2. a = 2.0 , b = 3.0 , c = 4.8;

The output should be in float type and the formatting string should be informative so that the user of the program can understand what is being printed. Only English should be used to explain the output. Name the source file for this part as **pa3p3.c** and submit it.

## Marking

This programming assignment is worth a total of 3% with 1% for each part.

## Assignment Submission

Submit **pa3p1.c**, **pa3p2.c** and **pa3p3.c** as well as the zipped folder of the three files, called **pa3.zip**, as four separate files through [Blackboard](#). Read [this page](#) to learn how to zip multiple files into a folder. Be prepared to explain to a TA in the next lab session about this assignment.

Notes:

1. Please work on the homework independently. The university has a zero-tolerance policy on plagiarism.
2. Our policy regarding AI assisted programming assignments will be announced later.