

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

Fall 2025

Programming Assignment #4 (2%)

Due: Friday October 10, 2025 (23:59)

Boolean Expressions, Logical Operations and Loops in C

Objectives

- Practice the use of if-else statements.

Part I: If Structures

In this part of the assignment, you will need to write a program to convert a term score between 0 and 100 to a term letter grade: A, B, C, D, and F. Specifically, the rules for the conversion are: a score between 90~100 is A, a score between 80~89 is a B a score between 70 and 79 is a C, a score between 60 and 69 is a D, and a score below 60 is an F. Note that in C there is no ternary conditional expression such as $a < b < c$. Instead, such an expression should be implemented in terms of two comparison operators and one logical operator as in: $(a < b) \ \&\& \ (b < c)$. Your program should prompt the user to input a score as an integer, convert it to a letter grade, and print out the letter grade with a meaningful message to report it.

Name your source file for this part as **pa4p1.c** and submit it.

Part II: Prime numbers with C for and while loops

Write a program to determine all the prime numbers between 100 and 200. A number is a prime number if it can only be divided by 1 and itself. To test if a number, say n , is exactly divisible by another, say m , one can simply compute the remainder of the division n/m . If the remainder is 0, then n is exactly divisible by m . We suggest that you write a program to test if one given number is prime first. Once successful, you can wrap that program in a while loop to test which of a range of numbers are prime, in the form of:

```
for (n = 100; n <= 200; n++) {  
    "while-loop that tests if n is prime"  
}
```

Name your source file for this part as **pa4p2.c** and submit it.

Part III: Numerical approximation of e^x

Write a program that evaluates an approximation of e^x using its Taylor series expansion given by: $e^x \approx \sum_{i=0}^n x^i / i!$ where $n!$ is n factorial. Please use the following program skeleton to complete this program.

```

#include <stdio.h>

/* Programming Assignment No. 4, Part 3 Skeleton

This C program computes an approximation of e^x using
the first n terms of its Taylor series expansion.
*/

int main() {
    int i, j;    // for loop counters
    int n, nfact; // order of the series and n!
    float x, ex; // ex = e^x
    float xtoi;  // variable to store x^i

    printf("Input n: ");
    scanf("%d", &n);
    printf("Input x: ");
    scanf("%f", &x);

    ex = 1;

    for(i=1; i<n; i++) {

        // fill in this part of the program yourself

    }

    printf("e^%-4.2f is approximately: %f.\n", x, ex);
    // %-5.2f: left justified, four digits, two after '.'
}

```

As an example, the expected output looks like:

```

Input n: 7
Input x: 2
e^2.00 is approximately: 7.355556.

```

Name your source file for this part as **pa4p3.c** and submit it.

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

Assignment Submission

Submit **pa4p1.c**, **pa4p2.c** and **pa4p3.c** as well as the zipped folder of the three files, called **pa4.zip**, as four separate files through [Blackboard](#). Be prepared to explain to a TA in the next lab session about this assignment.

Notes: Please work on the homework independently. The university has a zero-tolerance policy on plagiarism. Regarding the use of AI to assist you in completing assignments, please refer to “AI Policy” on course Blackboard.