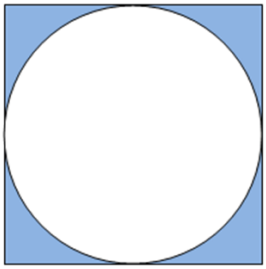
Assignment - Summer 2023
CSE 1110 - Introduction to Computer Systems
Course Teacher: Hamudi Hasan Sonet (HHS)

Student Id	Student Name	Section

01. Write a C program to convert a character to its opposite case (uppercase to lowercase or lowercase to uppercase). Non-alphabetic characters should remain unchanged.

Sample input	Sample output
A	a
d	D
5	5

02. A circle is placed perfectly into a square. The term perfectly placed means that each side of the square is touched by the circle, but the circle doesn't have any overlapping part with the square. Now you are given the radius of the circle. You have to find the area of the shaded region. Assume that pi = 3.1416



Hint: area of a square = (length of any side)^2 **&** area of a circle = π*(radius)^2

Sample input	Sample output
6	30.90
5	21.46

03. Write a C program to evaluate simple expressions of the form <number1> <operator> <number2>, where <operator> can be +, -, *, or /. Display the result of the expression evaluation.

Sample input	**Sample output**
1 + 2	3
5 * 10	50

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04. Create a program for a Rock-Paper-Scissor game where two players can play against each other. The program will take input from both players and display the result of the game based on the following rules:

- **Rock smashes scissor: Rock wins**
- **Scissor cuts paper: Scissor wins**
- **Paper wraps rock: Paper wins**

Sample input (Player 01, Player 02)	**Sample output**
R P	Paper wins (**Player 01**)
P S	Scissor wins (**Player 02**)

05. Write a C program to input electricity unit charge and calculate the total electricity bill according to the given conditions:

a) For **first 50** units Tk. 0.50/unit
b) For **next 100** units Tk. 0.75/unit
c) For **next 100** units Tk. 1.20/unit
d) For **unit above 250** Tk. 1.50/unit
e) An additional **surcharge of 20%** is added to the bill

Sample input (a, b, c)	**Sample output**
40	24.00
140	111.00
235	242.40

06. Write a program (WAP) that will find nCr where n >= r; n and r are integers.

Sample input	***Sample output***
5 2	10
10 3	120
7 7	1
6 1	6

07. Write a program that takes an integer number n as input and find out the sum of the following series up to n terms.

1 + 12 + 123 + 1234 + …….

Sample input	***Sample output***
1	1
2	13
3	136
4	1370

08. WAP that will determine whether an integer is palindrome number or not.

Sample input	***Sample output***
9	Yes
91	No
222	Yes
12321	Yes
110	No

09. Write a program in C that will print the factorial of a given number N

Sample input (N)	Sample output
1	1
2	2
3	6

Hint: Factorial of 3 (3! = 1*2*3) is 6

10. Write a C program to check vowel or consonant

Sample Input	Sample Output
A	A is a Vowel
K	K in a consonant

11. Program that will check whether a triangle is valid or not, when the three angles (angle value should be such that, 0 < value < 180) of the triangle are entered through the keyboard.

[**Hint:** A triangle is valid if the sum of all the three angles is equal to 180 degrees.]

Sample Input	Sample Output
90 45 45	Yes
30 110 40	Yes
160 20 30	No
0 180 0	No

12. Suppose that in a country, there are notes of 1, 5, 10, 50, 100 and 500 units of currencies. Write a C program which will take as input the amount of money to give, and find out the number of each note to provide this amount of money so that a minimal number of notes are given in total.

Sample Input	Sample Output
1627	3 note(s) of 500 1 note(s) of 100 0 note(s) of 50 2 note(s) of 10 1 note(s) of 5 2 note(s) of 1
789	1 note(s) of 500 2 note(s) of 100 1 note(s) of 50 3 note(s) of 10 1 note(s) of 5 4 note(s) of 1

13. Write a program (WAP) for the described scenario:

Player-1 picks a number **X** and Player-2 has to guess that number within **N** tries. For each wrong guess by Player-2, the program prints "Wrong, **N-1** Choice(s) Left!" If Player-2 at any time successfully guesses the number, the program prints "Right, Player-2 wins!" and terminates right away. Otherwise after the completion of **N** wrong tries, the program prints "Player-1 wins!" and halts.

(**Hint:** Use break/continue)

Sample Input (X,N,n1, n2,..,nN)	**Sample Output**
5 3 12 8 5	Wrong, 2 Choice(s) Left! Wrong, 1 Choice(s) Left! Right, Player-2 wins!
100 5 50 100	Wrong, 4 Choice(s) Left! Right, Player-2 wins!
20 3 12 8 5	Wrong, 2 Choice(s) Left! Wrong, 1 Choice(s) Left! Wrong, 0 Choice(s) Left! Player-1 wins!

14. Write a program (WAP) that will run and show keyboard inputs until the user types an 'A' at the keyboard.

Sample Input	**Sample Output**
X 1 a A	Input 1: X Input 2: 1 Input 3: a

15. Write a program (WAP) that will reverse the digits of an input integer.

Sample Input	**Sample Output**
13579	97531
4321	1234

16. Write a program (WAP) that will find the grade of **N** students. For each student, it will take the marks of his/her the attendance (on 5 marks), assignment (on 10 marks), class test (on 15 marks), midterm (on 50 marks), term final (on 100 marks). Then based on the tables shown below, the program will output his grade.

Attendance (A)	5%
Assignments (HW)	10 %
Class Tests (CT)	15 %
Midterm (MT)	30 %
Final (TF)	40 %

Marks	Letter Grade	Marks	Letter Grade	Marks	Letter Grade
90-100	A	70-73	C+	Less than 55	F
86-89	A-	66-69	C		
82-85	B+	62-65	C-		
78-81	B	58-61	D+		
74-77	B-	55-57	D		

Sample Input (A,HW,CT,MT,TF)	**Sample Output**
2 5 10 15 44.5 92.5 0 7.5 5 20 55.5	Student 1 : A Student 2 : F

17. Write a program (WAP) that will give the sum of first N^{th} terms for the following series.

1, -2, 3, -4, 5, -6, 7, -8, 9, -10, 11, -12, 13, -14, …….

Sample Input	**Sample Output**
2	Result: -1
3	Result: 2
4	Result: -2

18. Write a program (WAP) that will find ${}^{n}C_{r}$ where **n >= r**; **n** and **r** are integers.

Sample Input	Sample Output
5 2	10
10 3	120
7 7	1
6 1	6

19. WAP that will determine whether a number is prime or not.

Sample Input	Sample Output
1	Not prime
2	Prime
11	Prime
39	Not prime

20. WAP that will determine whether an integer is palindrome number or not.

Sample Input	Sample Output
9	Yes
91	No
222	Yes
12321	Yes

21. Write a program that takes an integer number n as input and find out the sum of the following series up to n terms.

$$1 + 12 + 123 + 1234 + \ldots\ldots$$

Sample Input	Sample Output
1	1
2	13
3	136
4	1370