Lab Assignment 2

Fall 2024

Course Title: Structured Programming Lab

Course Code: CSE 1202 (Fall 2024)

Submitted by:

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ID

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1. Write a program in C that computes the value for z, where z = x^3 + 3*(x^2)*(y^4)+y^2. The value of x and y should be taken from the user. Use pow() function to solve this problem.

Answer :

Algorithm:

1. Start the program and prompt the user to enter values for x and y.
2. Use the formula z = x^3+3*(x^2)*(y^4)+y^2. to calculate z,
   pow(x, 3) $= x^3$
   pow(x, 2) $= x^2$
   pow(y, 4) $= y^4$
   pow(y, 2) $= y^2$
3. Print the value of z.

Code

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

int main() {
    double x, y, z;

    printf("Enter value for x: ");
    scanf("%lf", &x);
    printf("Enter value for y: ");
    scanf("%lf", &y);

     z = pow(x, 3) + 3 * pow(x, 2) * pow(y, 4) + pow(y, 2);

    printf("The value of z is: %.2lf\n", z);

    return 0;
}
```

Output Result :

```
cd "/Users/m2air/Downloads/Python/" && gcc tempCodeRunner
m2air@m2s-MacBook-Air Python % cd "/Users/m2air/Downloads/
Enter value for x: 10
Enter value for y: 20
The value of z is: 48001400.00
m2air@m2s-MacBook-Air Python %
```

2. Print the value of y for given x=2 & z=4 and analyze the output.
a. y =X++++X; b. y=+X+++X;C.y=++X+++X+++X;
d. y = x>7; e. y= X>Z? X:Z; f. y = x&z;

Answer :

Given,

$x = 2$

$z = 4$

a) $\boldsymbol{y = x++ \; + \; ++x}$

x++ (post-increment), x++ uses the current value of x, which is 2, and then increments x by 1

So, x ++ = 2 and x becomes 3.

++x (pre-increment), ++x increments x by 1 first, making it 4, and then uses the value 4.

So, ++ x = 4

The Result $y = 2 + 4 = 6$

So, $y = 6$ & $x = 4$

b) $\boldsymbol{y = ++x \; + \; ++x}$,

x = 4, the first ++x , increments x to 5,

So, ++x = 5.

The second ++x, increments x to 6, so ++x = 6

$The\ results: y = 5 + 6 = 11$

So , $\boldsymbol{y = 11}$ & $\boldsymbol{x = 5}$

c) $\boldsymbol{y = ++x \; + \; ++x \; + \; ++x}$,

x = 6, The first ++x, increments x to 7,

So , ++x = 7,

The second ++x,increments x to 8,

So , ++x = 8,

The third ++x, increments x to 9,

So, ++x = 9,

$The\ results: y = 7 + 8 + 9 = 24$

So, $\boldsymbol{y = 24}$ & $\boldsymbol{x = 9}$.

d) $\boldsymbol{y = x > z}$,

x = 9 , x > z checks if x is greater than z,

9 is greater than 4, So, y = true

$The\ result\ \ y = true\ or\ 1$

e) y = x > z ? x : z,

x = 9,

If x > z, then y = x; otherwise, y = z,

$x = 9\ and\ z = 4, and\ 9 > 4\ is\ true, y = x = 9,$

$\boldsymbol{The\ Result\ y = 9}$

f) $y = x \,\&\, z$,
x = 9,
Bitwise AND between x (9) and z (4),
$Binary\ of\ x\ (9) = 1001$
$Binary\ of\ z\ (4) = 0100$
The Result , $The\ bitwise\ AND\ (1001\ \&\ 0100)\ results\ in\ 0000, which\ is\ 0.$
So, y = 0

4. Print the value of y for given x=2 & y=4 and analyze the output.
a. y = =x; b. y>= x; c x>=y;
d. x>=y && x==2; e. x>=y || x==2 ; f. x<=y && x==2

Answer :

Given Data ,
$x = 2 \ \ and \ \ y = 4$

a) y = =x,
First y = x , This assigns the value of x (which is 2) to y, so y becomes 2,
So, $y = 2$
Second, $y == x$,
y and x , checking if they are equal. Since y = 4 and x = 2, the result is false
So Final Result $y == x\ is\ false\ or\ 0$

b) y >= x,
y = 4 , x = 2,
if y (4) is greater than or equal to x (2),
So, 4 is greater than 2, this is true.
$The\ Result\ y >= x\ is\ true\ or\ 1$

c) x >= y,
if x (2) is greater than or equal to y (4),
So, 2 is not greater than or equal to 4, this is false.
$The\ Result\ x >= y\ is\ false\ or\ 0,$

d) $x >= y \,\&\&\, x == 2$,
This is Logical AND, So, if both conditions x >= y and x == 2 are true.
x >= y is false (x=2 and y=4).
$x == 2\ is\ true.$
Since one of the conditions is false, The entire expression evaluates to false or 0.
$The\ result\ x >= y \,\&\&\, x == 2\ is\ false\ or\ 0$

e) $x >= y \,||\, x == 2$,
This is Logical OR , So,if at least one of the conditions x >= y or x == 2 is true.
$x >= y\ is\ false$
$x == 2\ is\ true$
Since one of the conditions is true, the entire expression evaluates to true or 1
$The\ result = x >= y \,||\, x == 2\ is\ true\ or\ 1$

f) x <= y && x == 2,
This is Logical AND, So, if both conditions x <= y and x == 2 are true.
$x <= y\ is\ true\ (x = 2\ and\ y = 4)$
$x == 2\ is\ true$
Since both conditions are true, the entire expression evaluates to true or 1.
The result x <= y && x == 2 is true or 1.

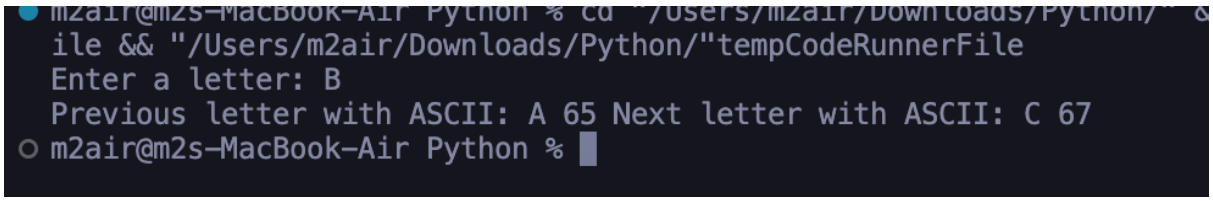
4. Write a C program to take a letter from the English alphabet as input and display both the previous and the next letters with ASCII codes. Assume that input will always be chosen from B to Y or b to y.

Algorithm:
1. Prompt the user to enter a letter.
2. Find the previous letter by subtracting 1 from the ASCII value of the input letter.
3. Find the next letter by adding 1 to the ASCII value of the input letter.
4. Print the previous and next letters with their ASCII values.

Code

```
#include <stdio.h>

int main() {
    char input, prev, next;

    printf("Enter a letter: ");
    scanf("%c", &input);

    prev = input - 1;
    next = input + 1;

    printf("Previous letter with ASCII: %c %d ", prev, prev);
    printf("Next letter with ASCII: %c %d\n", next, next);

    return 0;
}
```

Output Result :



Discussion :

This lab assignment provides a foundational understanding of core programming concepts in C. Through tasks like calculating formulas, using increment/decrement operators, applying logical and bitwise operations, and manipulating ASCII values, we learn to handle mathematical computations, condition-based logic, and text processing. The exercises emphasize precise control over variables and operations, which are essential skills for building more complex programs. This assignment not only reinforces mathematical and logical thinking but also prepares us for efficient, structured problem-solving in programming**.**