SOLVING SIMPLE PROBLEMS IN C

LAB 02

Section 5

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<u>Problem 1</u>

Display our full name, course title, and date each on a new line.
Create a file structure and run a basic program.

Analysis

We need to use two printf statements as the problem states that we
must display our full name, course title and date.

Design

- A printf statement to display our name.
- A printf statement to display course title.
- A printf statement to display the date.

Testing

For testing we need to check if the details are correct and are on new
lines.

Comments

The printf statements and the new line escape sequence plays a crucial
role in this code.

Screenshot 1(Code)

```c
/*---------------------------------------------------------------------------
-                SE 185: Lab 02 - Solving Simple Problems in C               -
-   Name:                                                                    -
-   Section:                                                                 -
-   NetID:                                                                   -
-   Date:                                                                    -
---------------------------------------------------------------------------*/

/*---------------------------------------------------------------------------
-                                Includes                                    -
---------------------------------------------------------------------------*/
#include <stdio.h>
#include <math.h>

/*---------------------------------------------------------------------------
-                            Implementation                                  -
---------------------------------------------------------------------------*/
int main(int argc, char *argv[])
{
    printf("Name:Aryan Rao\n");
    printf("Section:5\n");
    printf("NetID:aryanrao@iastate.edu\n");
    printf("Date: 09/07/2021\n");



    return 0;
}
```

Screenshot 2(Output)

```
aryanrao@C01318-01 ~
$ cd u:fall2021/se185/lab02

aryanrao@C01318-01 /cygdrive/u/fall2021/se185/lab02
$ gcc lab02-1.c -o lab02-1

aryanrao@C01318-01 /cygdrive/u/fall2021/se185/lab02
$ ./lab02-1
Name:Aryan Rao
Section:5
NetID:aryanrao@iastate.edu
Date: 09/07/2021

aryanrao@C01318-01 /cygdrive/u/fall2021/se185/lab02
$
```

Problem 2

This problem has two parts:
1. Calculate area of rectangle
2. Calculate volume of rectangle

Analysis

Height will be given to us by the user. We'll use the formula Area= width*height to calculate the area of the rectangle, and Volume= width*height*breadth to calculate volume of the rectangle.

Design

- Input values of width, height and breadth
- Compute Area and Volume
- Display the results

Testing

For testing we manually put the values and check them.

Comments

We need to make sure that we use the correct form of variables like int, float or double. On top of that we also have to see whether to use %d or %lf.

PART 1-Screenshot 1(Code)

```c
1
2    #include <stdio.h>
3    #include <math.h>
4
5    /*-----------------------------------------------------------------------
6    -                        Implementation                                  -
7    -----------------------------------------------------------------------*/
8    int main()
9    {
10     /*  printf("Name:Aryan Rao\n");
11         printf("Section:5\n");
12         printf("NetID:aryanrao@iastate.edu\n");
13         printf("Date: 09/07/2021\n");
14
15     */
16
17         int x,y;
18         printf("Enter width: ");
19         scanf("%d",&x);
20         printf("Enter height ");
21         scanf("%d",&y);
22         printf("A %d by %d rectangle's area is %d\n",x,y,x*y);
23
24
25
26
27         return 0;
28    }
29
```

PART 1-Screenshot 2(Output)

```
aryanrao@CO1318-01 /cygdrive/u/fall2021/se185/lab02
$ gcc lab02-2_1.c -o lab02-2_1

aryanrao@CO1318-01 /cygdrive/u/fall2021/se185/lab02
$ ./lab02-2_1
Enter width: 2
Enter height 3
A 2 by 3 rectangle's area is 6

aryanrao@CO1318-01 /cygdrive/u/fall2021/se185/lab02
$
```

PART 2-Screenshot 3(Code)

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

/*-------------------------------------------------------------------------
-                            Implementation                               -
--------------------------------------------------------------------------*/
int main()
{
  /*  printf("Name:Aryan Rao\n");
      printf("Section:5\n");
      printf("NetID:aryanrao@iastate.edu\n");
      printf("Date: 09/07/2021\n");

  */

      int x,y,z;
      printf("Enter width: ");
      scanf("%d",&x);
      printf("Enter height ");
      scanf("%d",&y);
      printf("Enter lenght ");
      scanf("%d",&z);
      printf("A %d by %d by %d cube's volume is %d\n",x,y,z,x*y*z);



      return 0;
}
```

PART 2-Screenshot 4(Output)

```
aryanrao@CO1318-01 /cygdrive/u/fall2021/se185/lab02
$ gcc lab02-2_2.c -o lab02-2_2

aryanrao@CO1318-01 /cygdrive/u/fall2021/se185/lab02
$ ./lab02-2_2
Enter width: 2
Enter height 64
Enter lenght 8
A 2 by 64 by 8 cube's volume is 1024

aryanrao@CO1318-01 /cygdrive/u/fall2021/se185/lab02
$ |
```

Problem 3

Compile the given program to find the given outputs.

Analysis

The code contains errors like syntax, and logical. We must compile and run the code to display the output.

Design

- Compile Statement 1
- Compile Statement 2
- Compile Statement 3
- Display all three

Testing

Since we already know the syntax, we do not need multiple tests.

Comments

Logic of the code is not important if the syntax in the first place is not right.

Screenshot 1(Code)

```c
/*-----------------------------------------------------------
-                        Includes                           -
-----------------------------------------------------------*/
#include <stdio.h>

/*-----------------------------------------------------------
-                     Implementation                        -
-----------------------------------------------------------*/
int main(int argc, char *argv[])
{
    int integer_result;
    double decimal_result;

    integer_result = 77 / 5;
    printf("The value of 77/5 is %d, using integer math.\n", integer_result); // %d is to be used in place of %lf as it is an integer

    integer_result = 2 + 3;
    printf("The value of 2+3 is %d.\n",integer_result); // no variable has been specified after the quotations.

    decimal_result = 1.0 / 22.0;
    printf("The value 1.0/22.0 is %lf.\n", decimal_result);// %lf is to be used in place of %d.

    return 0;
}
```

Screenshot 2(Output)

```
aryanrao@CO1318-01 /cygdrive/u/fall2021/se185/lab02
$ gcc lab02-3.c -o lab02-3

aryanrao@CO1318-01 /cygdrive/u/fall2021/se185/lab02
$ ./lab02-3
The value of 77/5 is 15, using integer math.
The value of 2+3 is 5.
The value 1.0/22.0 is 0.045455.

aryanrao@CO1318-01 /cygdrive/u/fall2021/se185/lab02
$
```

Problem 4

Perform arithmetic operations and display the calculations.

Analysis

The problem consists of a number of arithmetic operations. We need to type them and print the answers up to two decimals, using the printf statements.

Design

- Arithmetic Operations
- Printf statements

Testing

Calculate the values manually and compare them with the results.

Comments

The variables of int and double will print different values even if the calculations is the same. We must keep in mind when to use int and when to use double.

Screenshot 1(Code)

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

int main()
{
  int a;
  double b;
  a=6427+1725;
  printf("a. 6427 + 1725- %d\n",a);

  a=(6971*3925) - 95;
  printf("b. (6971*3925)-95-%d\n",a);

  b = 79 + 12/5;
  printf("c. 79 + 12/5-%.2lf\n",b);

  b= 3640.0/107.9;
  printf("d. 3640.0/107.9-%.2lf\n",b);

  a = (22/3) * 3;
  printf("e. (22/3)*3-%d\n",a);

  a = 22/(3 * 3);
  printf("f. 22/(3*3)%d\n",a);

  b=22/(3 * 3);
  printf("g. 22/(3*3)%.2lf\n",b);

  b=22/3*3;
  printf("h. 22/3*3-%.2lf\n",b);

  b= (22.0/3)*3.0;
  printf("i. (22.0/3)*3.0%.2lf\n",b);

  a=22.0/(3*3.0);
  printf("j. 22.0/(3*3.0)-%d\n",a);

  b=22.0/3.0*3.0;
  printf("k. 22.0/3.0*3.0-2%.2lf\n",b);

  double rad,area,m,c;
  rad=23.567/(2*M_PI); // circumference of a circle is 2 x pi x radius
  area= M_PI* M_PI * 8 * rad;  // area of circle is 2 x pi x radius^2
  printf("Area and radius of circle with circumference 23.567 is %.2lf and %.2lf\n",area,rad);

  m= 0.3048 * 14;
  printf("14 feet in meters is %.2lf\n",m); // 1 feet is 0.3048 meters

  c=(76-32)/1.8;
  printf("76F in celsius is %.2lf\n", c); // basic formula

  return 0;

}
```
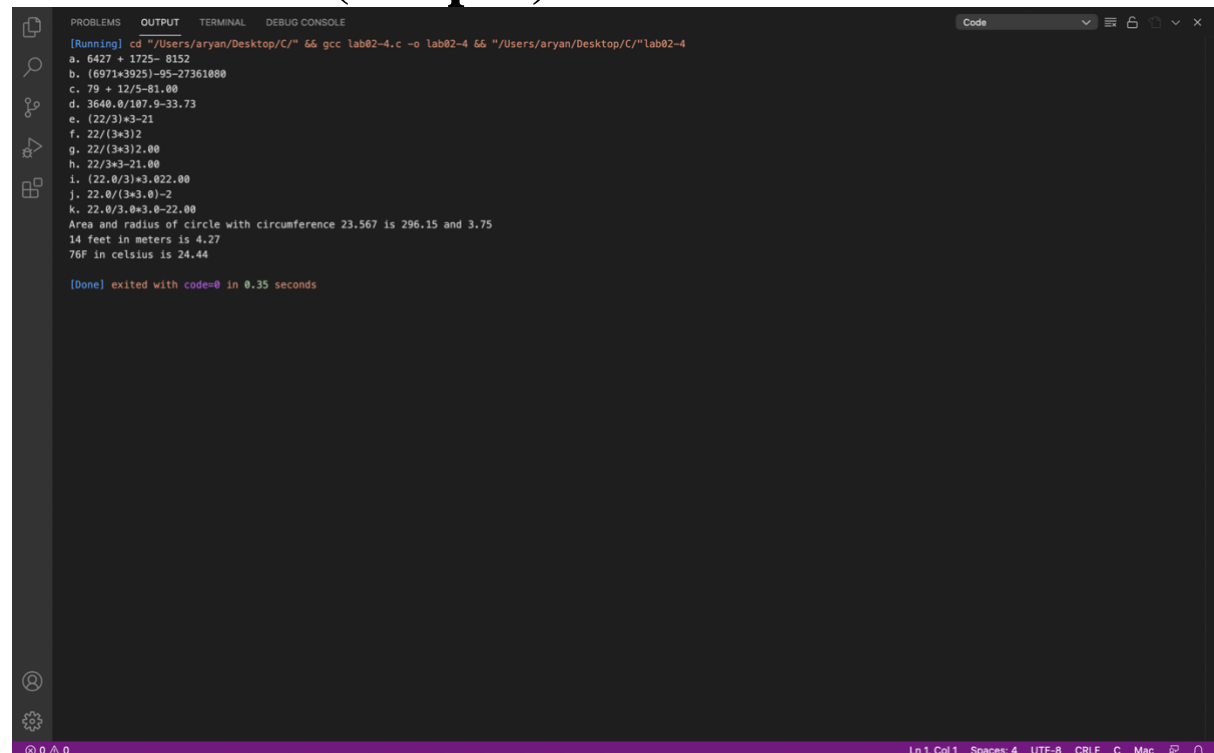
Screenshot 2(Output)

```
PROBLEMS    OUTPUT    TERMINAL    DEBUG CONSOLE                                                              Code

[Running] cd "/Users/aryan/Desktop/C/" && gcc lab02-4.c -o lab02-4 && "/Users/aryan/Desktop/C/"lab02-4
a. 6427 + 1725- 8152
b. (6971*3925)-95-27361080
c. 79 + 12/5-81.00
d. 3640.0/107.9-33.73
e. (22/3)*3-21
f. 22/(3*3)2
g. 22/(3*3)2.00
h. 22/3*3-21.00
i. (22.0/3)*3.022.00
j. 22.0/(3*3.0)-2
k. 22.0/3.0*3.0-22.00
Area and radius of circle with circumference 23.567 is 296.15 and 3.75
14 feet in meters is 4.27
76F in celsius is 24.44

[Done] exited with code=0 in 0.35 seconds
```

Problem 5

Find the third side of a triangle using the Pythagorean Theorem.

Analysis

Other two sides of the triangle will be provided to us by the user. We need to use the theorem which states the values of the third side is equal to the root of the sum of squares of other two sides.

Design

- Scanf statements to input sides
- Calculate the third side
- Display the output

Testing

For testing we need to manually calculate the third side and compare it with the output we get.

Comments

When using double, make sure to use %lf in the scanf statements otherwise it might generate an error.

Screenshot 1(Code)

```c
└------------------------------------------------------------------*/
#include <stdio.h>
#include <math.h>   // Google this header file to learn more! :)

/*------------------------------------------------------------------
-                        Implementation                           -
------------------------------------------------------------------*/
int main(int argc, char *argv[])
{
    double a, b, c;

    printf("Enter one side of a triangle: \n");
    scanf("%lf",&a);

    printf("Enter other side of a triangle: \n");
    scanf("%lf",&b);

    c=sqrt((a*a) + (b*b));
    printf("Last side is %lf\n", c);



    return 0;
}
```

Screenshot 2(Output)

```
aryanrao@CO1318-01 /cygdrive/u/fall2021/se185/lab02
$ gcc lab02-5.c -olab02-5

aryanrao@CO1318-01 /cygdrive/u/fall2021/se185/lab02
$ ./lab02-5
Enter one side of a triangle:
5
Enter other side of a triangle:
5
Last side is 7.071068

aryanrao@CO1318-01 /cygdrive/u/fall2021/se185/lab02
$ ./lab02-5
Enter one side of a triangle:
5
Enter other side of a triangle:
9
Last side is 10.295630

aryanrao@CO1318-01 /cygdrive/u/fall2021/se185/lab02
$
```