

# Lab 3

Westin Reasons

Due: April 20 2020

Submitted: April 20 2020

Option Submitted: C

Script written to build lab:

#buildthings.sh, script for lab 3 construction

```
gcc -c myLib.c -o myLib.o
ar rcs myLib.a myLib.o
gcc -c lab3.c -o lab3.o
gcc -o lab3 lab3.o -L. myLib.c
```

Main File:

```
/*
```

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```
*/
```

```
#include<stdlib.h>
```

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

```
#include "myLib.h"
```

```
void main()
```

```
{
```

```
    float radius, height, value, v1, v2, v3;
```

```
    int entries;
```

```
    printf("Enter the radius of a sphere: ");
```

```
    scanf("%f\n", &radius);
```

```
    sphere(radius);
```

```
    printf("enter the radius and height of a sphere: ");
```

```
    scanf("%f %f\n", &radius, &height);
```

```
    volCylinder(radius, height);
```

```
    printf("enter the number of floats in an array: ");
```

```
    scanf("%d\n", &entries);
```

```
    float x[entries];
```

```
    printf("enter floats to populate array: ");
```

```
    for (int i = 0; i < entries; i++)
```

```
    {
```

```

        scanf("%f", &x[i]);
    }
    sumFloats(x, entries);

    printf("enter 3 values for sin calculations: ");
    scanf("%f %f %f", &v1, &v2, &v3);
    sine(v1);
    sine(v2);
    sine(v3);

```

```

}

```

Library file:

```

/* My library */
#include<stdio.h>
#include<math.h>

```

```

FILE *OutFile;

```

```

void sphere(float radius)
{
    OutFile = fopen("lab3out.txt", "a");

    float pi, surface, volume;
    pi = M_PI;
    surface = 4.0*pi*(radius*radius);
    volume = (4.0/3.0)*pi*(radius*radius*radius);
    fprintf(OutFile, "Surface area: %8.3f cm^2 \n", surface);
    fprintf(OutFile, "Sphere volume: %8.3f cm^3 \n", volume);

    fclose(OutFile);
}

```

```

float volCylinder(float radius, float height)
{
    OutFile = fopen("lab3out.txt", "a");

    float pi, volume;

```

```

pi = M_PI;
volume = pi*(radius*radius)*height;
fprintf(OutFile, "Cylinder volume: %8.3f ft^3 \n", volume);

fclose(OutFile);
}

```

```

float sumFloats(float x[], int numFloats)
{
    OutFile = fopen("lab3out.txt", "a");

    float sum = 0.0;
    float sortSum = 0.0;

    for (int i = 0; i < (numFloats-1); i++)
    {
        sum += x[i];
    }

    fprintf(OutFile, "Sum of floats: %8.8f \n", sum);

    for (int j = 0; j < (numFloats-1); j++)
    {
        float temp;
        int *pt;
        int k;
        pt = &j;
        k = j + 1;
        while (k < numFloats)
        {
            if (x[j] > x[k])
            {
                *pt = k;
            }
            k += 1;
        }
        temp = x[j];
        x[j] = x[*pt];
        x[*pt] = temp;
    }
}

```

```
}
```

```
for ( int i = 0; i < (numFloats-1); i++)
```

```
{
```

```
    sortSum += x[i];
```

```
}
```

```
fprintf(OutFile, "Sum of floats, sorted: %8.11f\n", sortSum);
```

```
fprintf(OutFile, "The answers to these two sums should be different due to the point at which  
rounding begins within the number changing. \n");
```

```
fclose(OutFile);
```

```
}
```

```
double sine(float angle)
```

```
{
```

```
    OutFile = fopen("lab3out.txt", "a");
```

```
    float power, factorial, total, x, pi;
```

```
    x = angle;
```

```
    pi = M_PI;
```

```
    x = (pi*x)/180.0;
```

```
    total=0.0;
```

```
    for (int i=0; i<20; i++)
```

```
    {
```

```
        factorial = 1.0;
```

```
        power = 1.0;
```

```
        for (int j= 1; j<= 2*i+1; j++)
```

```
        {
```

```
            factorial = factorial * j;
```

```
            power *= x;
```

```
        }
```

```
        total += ((i%2?-1.0:1.0)/factorial)*power;
```

```
    }
```

```
    fprintf(OutFile, "sin(%8.3f) = %8.3frad\n", x, total);
```

```
    fclose(OutFile); }
```

Library header file:

```
/* header for library */  
void sphere(float radius);  
float volCylinder(float radius, float height);  
float sumFloats(float x[], int numFloats);  
double sine(float angle);
```

Input file:

```
17.583  
13.35 3.71  
8  
0.3476789 100400.8 0.0000099 1.343567 78.34567 1678.567 997999.6 0.0000009  
45 36 .0345
```

Output file:

```
Surface area: 3885.043 cm^2  
Sphere volume: 22770.238 cm^3  
Cylinder volume: 2077.238 ft^3  
Sum of floats: 1100159.000000000  
Sum of floats, sorted: 1100159.000000000000  
The answers to these two sums should be different due to the point at which rounding begins  
within the number changing.  
sin( 0.785) = 0.707rad  
sin( 0.628) = 0.588rad  
sin( 0.001) = 0.001rad
```

Terminal output:

```
(base) westin@sp00k:~/Desktop/special topics programming/laabs/lab 3$ ./buildthings.sh  
(base) westin@sp00k:~/Desktop/special topics programming/laabs/lab 3$ ./lab3 < lab3in.txt  
Enter the radius of a sphere: enter the radius and height of a sphere: enter the number of floats in  
an array: enter floats to populate array: enter 3 values for sin calculations:
```