

GNG 1106 Assignment 2

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Question 1:

Code Memory

```
#include <stdio.h>
/*-----*/
void main(void)
{
    // Variable declarations
    int logicVar; // logic variable
    double p, q; // some variables for creating logic expressions.
    // Instructions
    p = 39.54;
    q = 18.32;
    // Some logic expressions
    logicVar = (p <= q); // comparison of two variables
    logicVar = (38.77 + p < q) && (p > 10.0);
    logicVar = (p <= 21.3 ) || (2.1 <= q);
}
```

Working Memory

LogicVar = 2, 0, 0, 1

P = 2, 39.54

q = 2, 18.32

CPU

Question 2:

Code Memory

```
#include <stdio.h>
// Function prototype
double computeVariance4(double, double, double, double);
/*-----*/
void main()
{
    double n1;
    double n2;
    double n3;
    double n4;
    double variance;
    n1 = 31.236;
    n2 = 28.445;
    n3 = 35.78;
    n4 = 24.3;
    variance = computeVariance4(n1, n2, n3, n4);
    printf("The four values are: %.2f, %.2f, %.2f, %.2f\n",
           n1, n2, n3, n4);
    printf("The variance of the 4 values is %.2f\n",
           variance);
}
/*-----*/
double computeVariance4(double n1, double n2, double n3, double n4)
{
    double variance;
    double avg;
    avg = n1 + n2 + n3 + n4;
    avg = avg/4.0;
    variance = (n1 - avg)*(n1 - avg);
    variance = variance + (n2 - avg)*(n2 - avg);
    variance = variance + (n3 - avg)*(n3 - avg);
    variance = variance + (n4 - avg)*(n4 - avg);
    variance = variance/4.0;
    return(variance);
}
```

Working Memory

n1 = ?, 31.236

n2 = ?, 28.445

n3 = ?, 35.78

n4 = ?, 24.3

variance = ?, 17.46

n1 = 31.236

n2 = 28.445

n3 = 35.78

n4 = 24.3

avg = ?, ~~119.76~~, 29.94

variance = ?, ~~1.68, 3.91, 38.02,~~
~~69.83~~, 17.46

Console

The four values are 31.24, 28.45, 35.78, 24.30

The variance of the 4 values is 17.46

CPU

Question 3:

Source Code:

```
/*
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The purpose of this program is to calculate the weight
of a number of washers given the # of washers, density, thickness,
external diameter, and internal diameter. This program can be for calculations
for different metals as long as their metal density is given.
*/

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

//Prototype
double totalWeight(int, double, double, double, double);

/*
The main function prompts the user to enter in the data for calculation
and calls upon the totalWeight function to calculate the weight of the washers.
After calculating the weight the program prints the original data the user inputed
and prints the final calculation of the weight.
*/
int main()
{
    //Declaration of variables
    int num;
    double den, thick, ex_dia, in_dia, weight;

    //This section of code prompts the user to enter in the data of the washers.
    //Then it records the data in the variables defined earlier.
    printf("Please enter the number of washers: \n");
    scanf("%d", &num);
    printf("Please enter the density of the washer's material: \n");
    scanf("%lf", &den);
```

```

printf("Please enter the the thickness of the washer: \n");
scanf("%lf", &thick);
printf("Please enter the external diameter: \n");
scanf("%lf", &ex_dia);
printf("Please enter the diameter of the hole: \n");
scanf("%lf", &in_dia);

//The final weight is calculated by passing in the variables-
//into the totalWeight function then weight equal to the final answer.
weight = totalWeight(num, den, thick, ex_dia, in_dia);

system("cls"); //clears the screen to display all the data in a clear way.

//Displays all user inputted data plus the final answer.
printf("The washer characteristics are: \n");
printf("Density: %.5f Kg/cm^3\n", den);
printf("Thickness: %.3f cm\n", thick);
printf("External diameter: %.3f cm\n", ex_dia);
printf("Diameter of the hole: %.3f cm\n\n", in_dia);
printf("The weight of %d washers is %0.2e Kg", num, weight);

return 0;
}
/*
This function passes in the user inputted data to calculate the final weight:
num corresponds to the number of washers
den corresponds to the density of the metal
thick corresponds to the thickness of the washer
ex_dia corresponds to the external diameter
in_dia corresponds to the internal diameter
w is the final weight calculation that is returned to the "weight" variable in the
main function.

*/

```

```

double totalWeight(int num, double den, double thick, double ex_dia, double in_dia)
{
    double w; //variable for weight calculation.

    //Sequence of cumulative steps to calculate the final weight broken down from the
    given equation.

    w = pow(ex_dia, 2) - pow(in_dia, 2);

    w = num * den * thick * M_PI * w;

    w = w / 4;

    return w;
}

```

Outputs:

```

"D:\Documents\C++ Programming\GNG1106Assignment2\...
The washer characteristics are:
Density: 0.00760 Kg/cm^3
Thickness: 0.390 cm
External diameter: 4.400 cm
Diameter of the hole: 2.500 cm

The weight of 525 washers is 1.60e+001 Kg
Process returned 0 (0x0)   execution time : 17.662 s
Press any key to continue.

"D:\Documents\C++ Programming\GNG1106Assignment2\...
The washer characteristics are:
Density: 0.00760 Kg/cm^3
Thickness: 0.250 cm
External diameter: 2.350 cm
Diameter of the hole: 1.300 cm

The weight of 125 washers is 7.15e-001 Kg
Process returned 0 (0x0)   execution time : 22.285 s
Press any key to continue.

"D:\Documents\C++ Programming\GNG1106Assignment2\...
The washer characteristics are:
Density: 0.00260 Kg/cm^3
Thickness: 1.800 cm
External diameter: 24.900 cm
Diameter of the hole: 16.500 cm

The weight of 1 washers is 1.28e+000 Kg
Process returned 0 (0x0)   execution time : 14.723 s
Press any key to continue.

```

"D:\Documents\C++ Programming\GNG1106Assignment2\..."

```
The washer characteristics are:
Density: 0.00260 Kg/cm^3
Thickness: 0.030 cm
External diameter: 0.500 cm
Diameter of the hole: 0.230 cm

The weight of 1 washers is 1.21e-005 Kg
Process returned 0 (0x0)   execution time : 18.986 s
Press any key to continue.
```

"D:\Documents\C++ Programming\GNG1106Assignment2\..."

```
The washer characteristics are:
Density: 0.00890 Kg/cm^3
Thickness: 0.056 cm
External diameter: 0.690 cm
Diameter of the hole: 0.033 cm

The weight of 750 washers is 1.39e-001 Kg
Process returned 0 (0x0)   execution time : 20.232 s
Press any key to continue.
```

"D:\Documents\C++ Programming\GNG1106Assignment2\..."

```
The washer characteristics are:
Density: 0.00094 Kg/cm^3
Thickness: 0.290 cm
External diameter: 3.700 cm
Diameter of the hole: 2.100 cm

The weight of 1530 washers is 3.04e+000 Kg
Process returned 0 (0x0)   execution time : 30.589 s
Press any key to continue.
```