

GNG 1106
Fundamentals of Engineering Computation
Assignment 1 - Fall 2016
Report

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Question 1 (10 marks):

Program Memory

```
#include <stdio.h>

void main()
{
    double x, y, z;
    printf("Let's do a simple calculation.\n");
    x = 1.2;
    y = 3.39;
    z = (2.0*x + y/3.0)*x;
    printf("For x = %f and y = %f\n",
           x, y);
    printf("z = (2.0x + y/3.0)x = %f\n", z);
}
```

Working Memory

x ? 1.2
y ? 3.39
z ? 4.23

$$Z = [2.0 * 1.2 + 3.39 / 3.0] * 1.2$$

CPU

Program Memory

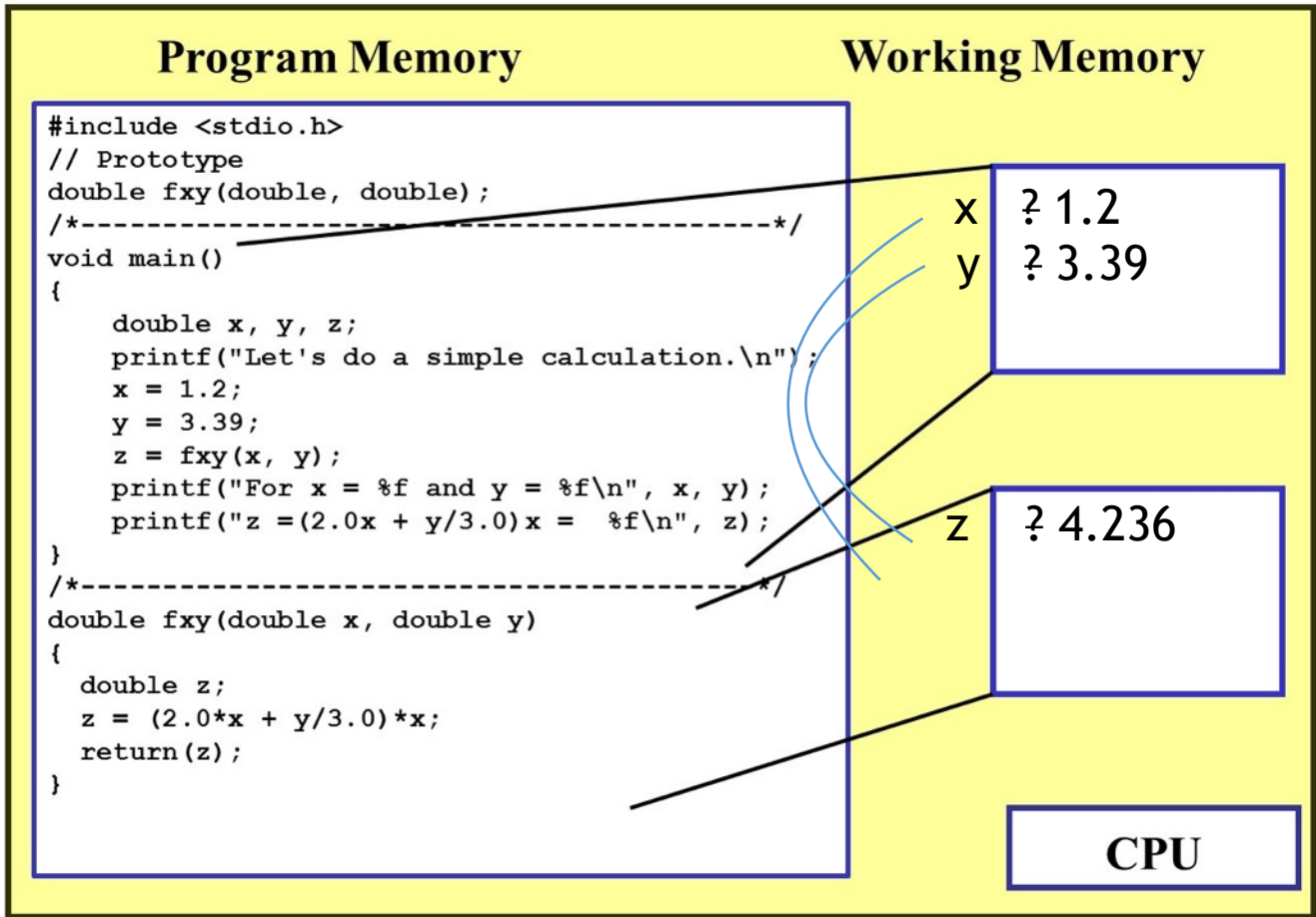
```
#include <stdio.h>
// Prototype
double fxy(double, double);
/*-----*/
void main()
{
    double x, y, z;
    printf("Let's do a simple calculation.\n");
    x = 1.2;
    y = 3.39;
    z = fxy(x, y);
    printf("For x = %f and y = %f\n", x, y);
    printf("z = (2.0x + y/3.0)x = %f\n", z);
}
/*-----*/
double fxy(double x, double y)
{
    double z;
    z = (2.0*x + y/3.0)*x;
    return(z);
}
```

Working Memory

x ? 1.2
y ? 3.39

z ? 4.236

CPU



Question 2:

Code:

```
/*-----  
File:A1-Distance Calculation  
Author: Menat Allah Taleb  
Description: This program calculates the distance based on initial velocity, time, and acceleration.  
-----*/  
  
#include <stdio.h>  
//function prototypes  
double calculatedistance (double, double,double);  
  
/*-----  
Function: Main  
Description: This function asks the user for the input which are the initial velocity, time, and acceleration. Then it  
calls upon function "calculatedistance" and it displays the output,which is the returned value of the function  
"calculatedistance"  
-----*/  
void main ()  
{  
    double time, acceleration, iv, final;  
    printf("Please enter the time in seconds:\n");  
    scanf("%lf",&time);  
    printf("Please enter the acceleration in m/s^2:\n");  
    scanf("%lf",&acceleration);  
    printf("Please enter the initial velocity in m/s:\n");  
    scanf("%lf",&iv);  
    final = calculatedistance (time, acceleration, iv);  
    printf("The distance is:%lf",final);  
}  
  
/*-----  
Function: calculatedistance  
Parameters:  
  
Return: This function returns the distance calculated in metres.  
Description: This function receives the input,then using a formula, it calculates the distance. It then stores it till it  
is called upon by the main function  
-----*/  
double calculatedistance (double time, double acceleration, double iv)  
{  
    double distance;  
    distance = ((iv * time) + (0.5 * acceleration * (time*time)));  
    return distance;  
}
```

Output:**Test case 1:**

Please enter the time in seconds:

10

Please enter the acceleration in m/s^2 :

0

Please enter the initial velocity in m/s :

1

The distance is:10.000000

Program ended with exit code: 25

Test Case 2:

Please enter the time in seconds:

0.5

Please enter the acceleration in m/s^2 :

250

Please enter the initial velocity in m/s :

0

The distance is:31.250000

Program ended with exit code: 25

Test Case 3:

Please enter the time in seconds:

5.2

Please enter the acceleration in m/s^2 :

0.5

Please enter the initial velocity in m/s :

10.2

The distance is:59.800000

Program ended with exit code: 25

Test Case 4:

Please enter the time in seconds:

120

Please enter the acceleration in m/s^2 :

1.2

Please enter the initial velocity in m/s :

60

The distance is:15840.000000

Program ended with exit code: 28

Test Case 5:

Please enter the time in seconds:

0

Please enter the acceleration in m/s^2 :

1.2

Please enter the initial velocity in m/s :

60

The distance is:0.000000

Program ended with exit code: 24

Question 3:

Test cases:

Type of gas	Molecular Weight	Mass (kg)	Temperature (celsius)	Volume
Benzene	78.114	2.0	-160.0	0.2377
Argon	39.98	10.0	25.2	6.1231
Hydrogen	2.016	0.1	-200.0	0.2977
Nitrogen	28.0134	50.0	-50.0	32.6809
R-114	170.93	25.5	4.50	3.3987

Code:

```
/*-----  
File: A1-Calculating volume  
Author: Menat Allah Taleb  
Description: This program takes in the temperature, molecular weight, and mass from the user for a specific gas,  
then it calculates the volume using the ideal gas law.  
-----*/  
  
#include <stdio.h>  
//Function Prototypes  
double calculatevolume (double, double, double);  
  
/*-----  
Function: main  
Description: This function will ask the user to input the molecular weight, mass, and the temperature for a specific  
gas. The function will then call upon the function "calculatevolume" to return the result calculated. The main  
function will then display the result.  
-----*/  
void main()  
{  
    double molecular, mass, tempC, final;  
  
    printf("Please enter the molecular weight of the gas in kg/moles: \n");  
    scanf("%lf",&molecular);  
    printf("Please enter the mass in kg: \n");  
    scanf("%lf",&mass);  
    printf("Please enter the temperature in celsius: \n");  
    scanf("%lf",&tempC);  
    final = calculatevolume (molecular,mass,tempC);  
    printf("The volume of the specified gas is: %lf",final);  
}  
/*-----  
Function: calculatevolume  
Parameters:  
molecular, mass, tempC  
Return: This function returns the volume
```

Description: This function calculates the volume by using the ideal gas law, by using the input from the main function. It then stores the value till it is called upon by the main function to be displayed.

```
-----*/  
double calculatevolume (double molecular, double mass, double tempC)  
{  
    double tempK, volume;  
    tempK = tempC + 273.15;  
    volume = ((mass/molecular) * 8.314 * tempK)/ 101.325;  
  
    return (volume);  
}
```

Output:

Test Case 1:

Please enter the molecular weight of the gas in kg/moles:

78.114

Please enter the mass in kg:

2.0

Please enter the temperature in celsius:

-160

The volume of the specified gas is: 0.237711

Program ended with exit code: 45

Test Case 2:

Please enter the molecular weight of the gas in kg/moles:

39.98

Please enter the mass in kg:

10.0

Please enter the temperature in celsius:

25.2

The volume of the specified gas is: 6.123175

Program ended with exit code: 45

Test Case 3:

Please enter the molecular weight of the gas in kg/moles:

2.016

Please enter the mass in kg:

0.1

Please enter the temperature in celsius:

-200

The volume of the specified gas is: 0.297726

Program ended with exit code: 45

Test Case 4:

Please enter the molecular weight of the gas in kg/moles:

28.0134

Please enter the mass in kg:

50

Please enter the temperature in celsius:

-50

The volume of the specified gas is: 32.680936

Program ended with exit code: 46

Test Case 5:

Please enter the molecular weight of the gas in kg/moles:

170.93

Please enter the mass in kg:

25.5

Please enter the temperature in celsius:

4.50

The volume of the specified gas is: 3.398701

Program ended with exit code: 45