GNG1106 Assignment 1

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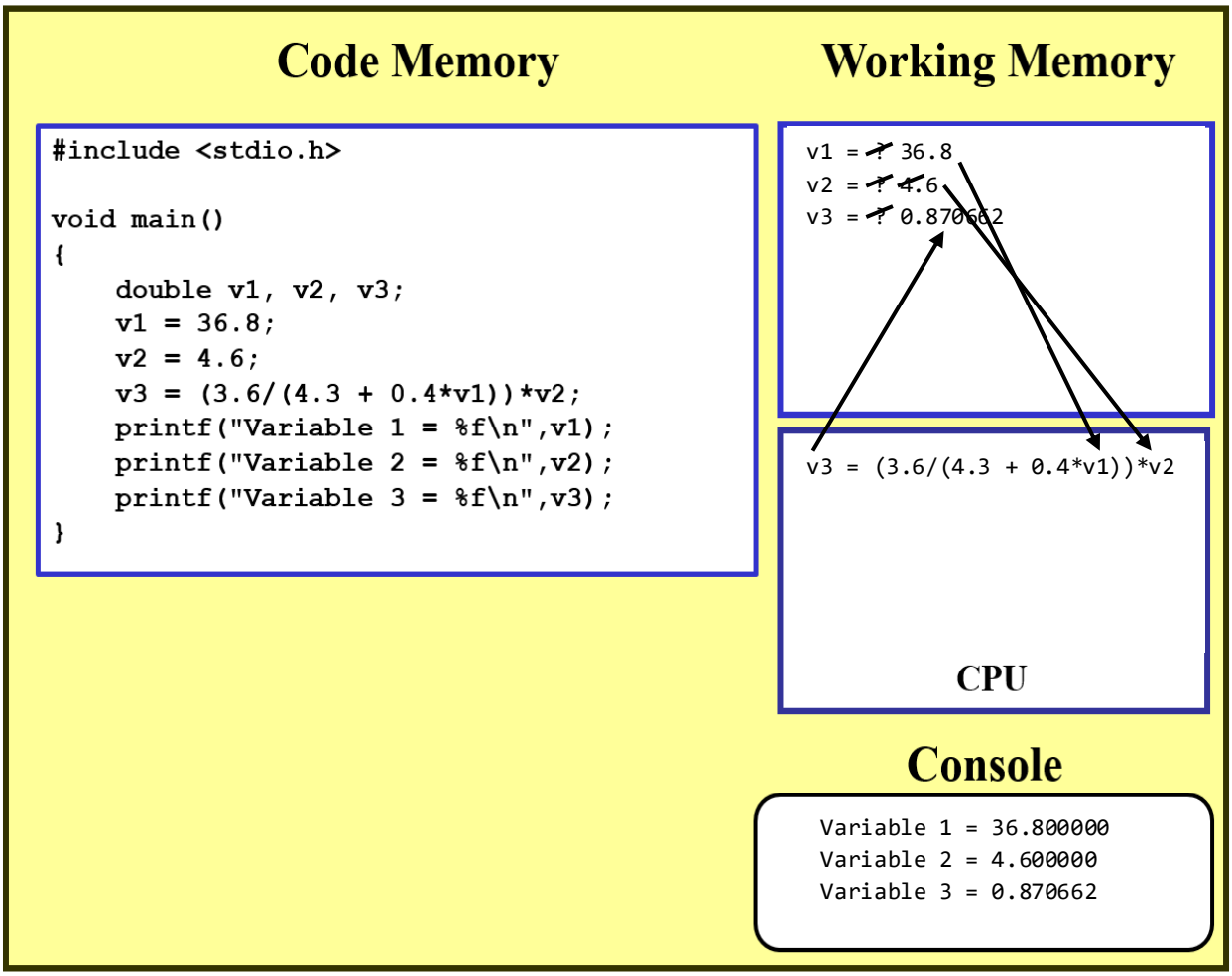
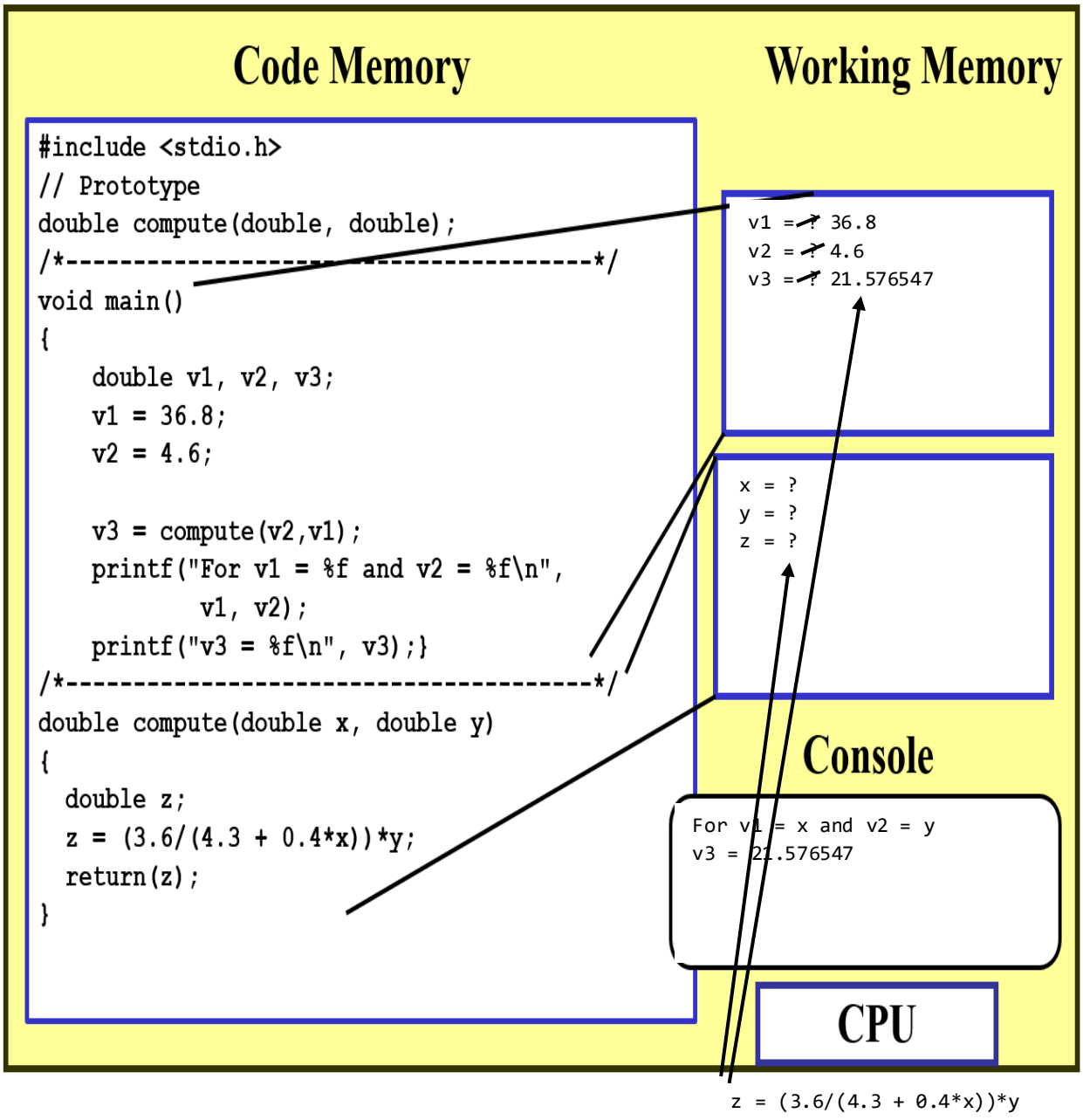
Question 1

Part 1



Part 2


Code Memory
Working Memory
#include <stdio.h>
// Prototype
double compute(double, double);
/*-------------------------------------*/
void main()
{
double v1, v2, v3;
v1 = 36.8;
v2 = 4.6;
v3 = compute(v2,v1);
printf("For v1 = %f and v2 = %f\n",
v1, v2);
printf("v3 = %f\n", v3);}
/*-------------------------------------*/
double compute(double x, double y)
{
double z;
z = (3.6/(4.3 + 0.4*x))*y;
return(z);
}
v1 = ? 36.8
v2 = ? 4.6
v3 = ? 21.576547
x = ?
y = ?
z = ?
Console
For v1 = x and v2 = y
v3 = 21.576547
CPU
z = (3.6/(4.3 + 0.4*x))*y

Question 2

Source Code

```c
#include <stdio.h>
double calculateSpeed(double t);

void main()
{
    double t;
    printf("Enter a time value to calculate the velocity: \n");
    scanf("%lf", &t);
    printf("At time %3.2f,", t);
    printf(" the speed of the plane is %3.5f m/s", calculateSpeed(t));
}

double calculateSpeed(double t)
{
    double v = 0.00001*t*t*t - 0.00488*t*t + 0.75795*t + 181.3566;
    return v;
}
```

Test Case 1:

```
c:\Users\kbzjn\Google Drive\ELG - Year 1\2019 Winter Ter
1 Code>"Q2-AircraftVelocityTimeCalc.exe"
Enter a time value to calculate the velocity:
0
At time 0.00, the speed of the plane is 181.35660 m/s
c:\Users\kbzjn\Google Drive\ELG - Year 1\2019 Winter Ter
1 Code>
```

Test Case 2:

```
c:\Users\kbzjn\Google Drive\ELG - Year 1\2019 Winter Term\
1 Code>"Q2-AircraftVelocityTimeCalc.exe"
Enter a time value to calculate the velocity:
2
At time 2.00, the speed of the plane is 182.85306 m/s
c:\Users\kbzjn\Google Drive\ELG - Year 1\2019 Winter Term\
1 Code>
```

Test Case 3:

```
c:\Users\kbzjn\Google Drive\ELG - Year 1\2019 Winter Term\
1 Code>"Q2-AircraftVelocityTimeCalc.exe"
Enter a time value to calculate the velocity:
10
At time 10.00, the speed of the plane is 188.45810 m/s
c:\Users\kbzjn\Google Drive\ELG - Year 1\2019 Winter Term\
1 Code>
```

Test Case 4:

```
c:\Users\kbzjn\Google Drive\ELG - Year 1\2019 Winter Term\G
1 Code>"Q2-AircraftVelocityTimeCalc.exe"
Enter a time value to calculate the velocity:
50
At time 50.00, the speed of the plane is 208.30410 m/s
c:\Users\kbzjn\Google Drive\ELG - Year 1\2019 Winter Term\G
1 Code>
```

Test Case 5:

```
c:\Users\kbzjn\Google Drive\ELG - Year 1\2019 Winter Term\
1 Code>"Q2-AircraftVelocityTimeCalc.exe"
Enter a time value to calculate the velocity:
100
At time 100.00, the speed of the plane is 218.35160 m/s
c:\Users\kbzjn\Google Drive\ELG - Year 1\2019 Winter Term\
1 Code>
```

Test Case 6:

```
c:\Users\kbzjn\Google Drive\ELG - Year 1\2019 Winter Term\
1 Code>"Q2-AircraftVelocityTimeCalc.exe"
Enter a time value to calculate the velocity:
120
At time 120.00, the speed of the plane is 219.31860 m/s
c:\Users\kbzjn\Google Drive\ELG - Year 1\2019 Winter Term\
1 Code>
```

Question 3

Source Code

```c
#include <stdio.h>

#define REF_TEMP 20
#define COEFF_CU 4.041e-3
#define COEFF_AL 4.308e-3

float rCalc(float temp, float rRef, float coeffNum);
float rRefCalc(float rPerLength, float length);

void main()
{
    float temp;
    float length;
    float rPerLength;

    printf("This program calculates the resistance of copper and aluminium coils and at given
temperature (in degrees Celsius) and length\n");

    printf("Enter the temperature in Celsius: ");
    scanf("%f", &temp);
    printf("Enter coil length: ");
    scanf("%f", &length);
    printf("Enter resistance per length of given coil: ");
    scanf("%f", &rPerLength);

    float rRef = rRefCalc(rPerLength, length);
    float rAl = rCalc(temp, rRef, COEFF_AL);
    float rCu = rCalc(temp, rRef, COEFF_CU);

    printf("The resistance of an aluminum coil at temperature %f degrees Celsius with ",
temp);
    printf("length %f meters, ", length);
    printf("is: %f ohms\n", rAl);
    printf("The resistance of a copper coil of the same temperature and length is: %f ohms\n",
rCu);
}

float rCalc(float temp, float rRef, float coeffNum)

{
    float r = rRef*(1+coeffNum*(temp - REF_TEMP));
    return r;
}
```

```
float rRefCalc(float rPerLength, float length)

{
    float rRef = rPerLength * length;
    return rRef;
}
```

Test Cases Table:

Test Case	Temperature (°C)	Resistance per unit length (ohms/m)	Length (m)	Resistance of aluminium coil (ohms)	Resistance of copper coil (ohms)
1	40	0.00327	0.1	0.000355	0.000353
2	80	0.05	1	0.062924	0.062123
3	160	1	5	8.0156	7.8287
4	180	2.5	50	211.160004	205.819992
5	200	3.55	100	630.281189	613.21991

Test Case 1:

```
This program calculates the resistance of aluminium and copper coils and at given temperature (in degrees Celsius) and length
Enter the temperature in Celsius: 40
Enter coil length: 0.1
Enter resistance per length of given coil: 0.00327
The resistance of an aluminium coil at temperature 40.000000 degrees Celsius with length 0.100000 meters, is: 0.000355 ohms
The resistance of a copper coil of the same temperature and length is: 0.000353 ohms
```

Test Case 2:

```
This program calculates the resistance of aluminium and copper coils and at given temperature (in degrees Celsius) and length
Enter the temperature in Celsius: 80
Enter coil length: 1
Enter resistance per length of given coil: 0.05
The resistance of an aluminium coil at temperature 80.000000 degrees Celsius with length 1.000000 meters, is: 0.062924 ohms
The resistance of a copper coil of the same temperature and length is: 0.062123 ohms
```

Test Case 3:

```
This program calculates the resistance of aluminium and copper coils and at given temperature (in degrees Celsius) and length
Enter the temperature in Celsius: 160
Enter coil length: 5
Enter resistance per length of given coil: 1
The resistance of an aluminium coil at temperature 160.000000 degrees Celsius with length 5.000000 meters, is: 8.015600 ohms
The resistance of a copper coil of the same temperature and length is: 7.828700 ohms
```

Test Case 4:

```
This program calculates the resistance of aluminium and copper coils and at given temperature (in degrees Celsius) and length
Enter the temperature in Celsius: 180
Enter coil length: 50
Enter resistance per length of given coil: 2.5
The resistance of an aluminium coil at temperature 180.000000 degrees Celsius with length 50.000000 meters, is: 211.160004 ohms

The resistance of a copper coil of the same temperature and length is: 205.819992 ohms
```

Test Case 5:

```
This program calculates the resistance of aluminium and copper coils and at given temperature (in degrees Celsius) and length
Enter the temperature in Celsius: 200
Enter coil length: 100
Enter resistance per length of given coil: 3.55
The resistance of an aluminium coil at temperature 200.000000 degrees Celsius with length 100.000000 meters, is: 630.281189 ohms
The resistance of a copper coil of the same temperature and length is: 613.219910 ohms
```