**CMPE112/CMSE112 Questions with solutions**

**Question 1) Give the outputs of the following 9 programs. Note that your answers must be given in the boxes appended to each question:**

**A.)** #**include <stdio.h>**

**int main()**

1. **19**
2. **19**
3. **19**

**{**

 **int i=3;**

 **while(i--)**

 **{**

 **static int a = 8;**

 **char b = 20;**

 **a += 3; b--;**

 **printf("%d %d\n", a, b);**

 **}**

**return 0;}**

**B.)** #**include <stdio.h>**

|  |
| --- |
| **1.0 3.0 9.0** **i=7 j=0** |

**int main()**

**{**

 **int i , j;**

 **double x = 0;**

 **for (i = 0 , j = 7 ; j > 0 ; i++ , j --)**

 **{**

 **if (i < j) continue;**

 **x += i / j;**

 **printf(" %3.1f" , x);**

 **if (i == j) break;**

 **}**

 **printf("\n i=%d j=%d" , i , j);**

**return 0;}**

**C.)** **#include <stdio.h>**

**int f(int a) { return a%2 ? ++a : a--; }**

|  |
| --- |
| **(0,2) (1,4) (2,6) (3,8) (4,12)** |

**int main()**

**{**

 **int i , a = 2;**

 **for (i = 0 ; i < 5 ; i++)**

 **{ a += i;**

 **printf(" (%d,%d)" , i , f(a));**

 **}**

**return 0;}**

**D.)** #**include <stdio.h>**

|  |
| --- |
| **500** |

**int main()**

**{**

 **int sum = 0;**

 **for (i=0;i<50;i++);**

 **for (j=0;j<5;j++) sum += i\*j;**

 **printf(“%d\n”,sum”);**

 **return 0;}**

**E.)**

**#include <stdio.h>**

**5 11**

**void fun(int, int);**

**int main()**

**{**

 **int x=5, y=11;**

 **fun(x+7, y);**

 **printf("%d %d\n", x, y);**

**return 0;}**

**void fun(int r, int s)**

**{**

 **r /= 2; s /= 3;**

**}**

**F)**

**x (or y) x (in f) n i i<n**

**2 🡪 2 8 5 0 T**

**4 🡪 5 9 1 T**

**8 🡪 10 10 2 T**

**16🡪 19 11 3 T**

**32🡪 36 12 4 T**

 **13 5 N**

**#include <stdio.h>**

**void f(float x, float y[],int n)**

**{**

 **int i;**

 **for(i=0;i<n;i++)**

 **{**

 **x++;**

 **y[i]=y[i]+i;**

 **printf(“I=%d and Y = %.2f X = %.2f \n”, i , y[i] , x);**

 **}**

**}**

**I=0 and Y =2.00 X = 9.00**

**I=1 and Y =5.00 X = 10.00**

**I=2 and Y =10.00 X = 11.00**

**I=3 and Y =19.00 X = 12.00**

**I=4 and Y =36.00 X = 13.00**

**The result is = 10.00 and 19.00**

The Result is =10.00 and 19.00

**int main()**

**{**

 **int m=5;**

 **float x[]={2 , 4 , 8 , 16 , 32};**

 **f(x[2] , x , m);**

 **printf("The Result is =%.2f and %.2f ",x[2],x[3]);**

 **return 0;**

 **}**

**G)**

**#include <stdio.h>**

**int k , x;**

**void f(int x)**

**{ static int y=0;**

 **int z=0;**

 **printf("%d %d %d %d\n", x , y , z , k);**

 **if (x > (y+z)) { y+=2;**

 **z++;**

 **x--;**

 **k+=z;**

 **}**

**}**

**int main()**

**{ x=10;**

 **k=8;**

 **while(x>=k)**

 **f(x);**

 **printf("%d %d", x, k);**

**return 0;**

**return 0;}**

# **TRACE OUTPUT**

10 0 0 8

10 2 0 9

10 4 0 10

10 11

Main f(x)

k x x y z

1. 10 10 0 0
2. 10 9 2 1
3. 10 10 4 0
4. 10 9 6 1
5. 1

9

**H**)

**#include<stdio.h>**

**void fun1(int a[], int length)**

**{**

**int i;**

**for (i = 0; i<length; i++)**

 **a[i] = a[i] \* a[i] –a[i];**

**length = 2 \* length;**

**return;**

**}**

**int main()**

**{**

**int b[5] = {2, 3, 4, 5, 6};**

**fun1(b, b[1]);**

**for (i = 0; i<5; i++)**

 **printf(“%d ”, b[i]);**

**return 0;**

**}**

 **trace output**

2 6 12 5 6

i a[i] length

0 2 3

1 6 3

2 12 3

**I)**

**#include <stdio.h>**

5 2 2

4 3 1

3 4 0

**int main()**

**{**

 **int a=6,b=1,c=3;**

 **while(a<b<c)**

 **{**

 **switch(a<b<c)**

 **{**

 **default : ++a;**

 **continue;**

 **case 1 : --a;--c;**

 **case 0 : ++b;**

 **break;**

 **}**

 **printf("%d %d %d\n",a,b,c);**

 **}**

**return 0;}**

**J)**

res=15

res=15

res=12

a b c

0 0 15

1 2 15-2-1=12 condition is true

2 3 12-2-3=7 condition is tru

3 4 7-3-4=0 condition is false

Output

res=15 (0+0+15)

res=15 (12+2+1)

res=12 (7+3+2)

**#include <stdio.h>**

**int main()**

**{**

 **int a=0,b=0,c=15;**

 **do**

 **{**

 **printf("res=%d\n",a+b+c);**

 **}while(++a,b=a+1,c-=a+b);**

**return 0;}**

**Question 2) Give expression equivalent to following:**

**a)** rewrite using **switch** construction

**switch(a){**

**case ‘a’:x++;break;**

**case ‘b’:x--;break;**

**default : y++;}**

 **if (a==’a’) x++;**

 **else if (a==’b’) x--;**

 **else y++;**

**b)** rewrite **without continue**

**while(1)**

**{**

 **if(scanf(“%c”,&a) , a != ’1’) x++;**

**}**

**while(1)**

**{**

 **if (scanf(“%c”,&a) , a == ’1’ ) continue;**

 **x++;**

 **}**

 **c)** rewrite using **for** construction instead of **while**

 y**ear=1900; sum=0;**

**for(year=1900,sum=0;year<4002;sum+=year,year+=sum)**

**printf(“\nYear=%d”,year);**

 **while(year<=4002)**

 **{**

 **sum+=year;**

 **printf(“\nYear=%d”,year);**

 **year+=sum;**

 **}**

**d)** rewrite using ternary **C** **operator ?** :

**a=x<y?x+1:y+1;**

**or**

**x<y? a=x+1:a=y+1;**

 **if (x<y) a = x + 1;**

 **else a = y + 1;**

**Question 3**) The following program is supposed to display

 \*\*\*\*\*

 \* \*

 \* \*

 \* \*

 \*\*\*\*\*

as the output but one statement is missing. Fill the missing statement into **only** **one** of the spaces given below.

**#include <stdio.h>**

**int main()**

**{**

**int i;**

 **for(i=0;i<5;i++)**

 **{**

 **switch(i)**

 **{ case 0: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_;**

 **case 4: printf("\*\*\*\*\*\n"); break ;**

 **default: printf("\* \*\n"); \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_;**

 **}**

 **}**

**}**

**Question 4) Fill in the blanks (denoted by \_\_\_\_ ) in the following program:**

**/\* This program computes the arithmetic mean (average) \*/**

**/\* of those numbers entered upto Ctrl^Z (EOF) is pressed.\*/**

**/\* The numbers that are greater than 100 or less than –100 are \*/**

**/\* ignored and not included in the mean. \*/**

**#include <stdio.h>**

**#define THRESHOLD 100**

**main()**

**{**

 **int n;**

 **float x, sum;**

 **sum = n = 0;**

 **while(1)**

 **{**

 **if(scanf(“%f”, &x) == EOF) \_\_break\_\_\_\_\_\_\_\_\_\_;**

 **if(x > THRESHOLD || x < -THRESHOLD) \_\_\_\_continue\_\_\_\_\_\_\_\_\_\_;**

 **n++; sum += x**

 **}**

 **printf("Arithmetic mean is %6.3f.", sum/n);**

**}**

**Question 5)** Write a **main()** using the **dispNumbers()** function to display the output given in the box.

**#include<stdio.h>**

**1**

**21**

**321**

**4321**

**321**

**21**

**1**

**void dispNumbers(int n)**

**{**

 **int i;**

 **for ( i=n;i>0;i--)**

 **printf("%d",i);**

 **printf("\n");**

**}**

int main()

{

 int i

 for (i=1;i<4;i++)

 dispNumbers(i);

 for (i=4;i>0;i--)

 dispNumbers(i);

return 0;}

**Question 6**

Write a C program which will **compute and display GPA** value for a student. It is assumed that each student has taken **just 5 courses**. Each course is described by **Course code**, **Letter grade** and **Course credit.** The input data to the program must be the following information in that order with the data types as indicated:

* Student number (long integer)
* Name of the student (string)

 For each course;

* Course code (string of 7 characters)
* Letter grade(one of the characters ‘A’, ’B’, ’C’, ’D’, ’F’)
* Course Credit (integer)

Grading system shown below will be used for calculating the GPA value:

|  |  |  |
| --- | --- | --- |
| Letter Grade |  | Point Count |
| A |  | 4 |
| B |  | 3 |
| C |  | 2 |
| D |  | 1 |
| F |  | 0 |

#### GPA=

**Example:** A sample input data entered from the keyboard is as follows:

# **970023**

# **MUSTAFA celik**

***MATH101 B 4***

## PHYS101 C 4

***CMPE102 A 3***

***MATH163 C 4***

***ELT101 F 3***

Then, the program will display the following output on the monitor:

###### Student Number = 970023

######  Name = MUSTAFA celik

###### GPA = 2.22

######

Calculation of **GPA** for the given sample input of data is done as follows using the formula above:

#### GPA=(4\*3.0+4\*2.0+3\*4.0+4\*2.0+3\*0.0)/(4+4+3+4+3) = 2.22

Solution

**#include <stdio.h>**

**int main()**

**{**

**long studnumber;**

**char name[15], coursecode[7] , lettergrade;**

**int credit , i , point;**

**float totalpoint, totalcredit , gpa;**

**printf("Enter Student number and Name \n");**

**scanf("%ld %s",&studnumber , name);**

**for (i=0;i<5;++i)**

**{**

 **printf("Enter %d Course information \n",i+1);**

 **scanf("%s %c %d",&coursecode, &lettergrade, &credit);**

 **switch (lettergrade)**

 **{**

 **case 'A':point=4;break;**

 **case 'B':point=3;break;**

 **case 'C':point=2;break;**

 **case 'D':point=1;break;**

 **default : point=0;**

 **}**

 **totalpoint+=point\*credit;**

 **totalcredit+=credit;**

 **}**

 **gpa = totalpoint / totalcredit;**

 **printf("Student Number =%ld Name = %s GPA = %.2f",studnumber , name , gpa);**

 **return 0;**

 **}**

**Question 7**)Write a program that:

1. **Read** two integer arrays of variables **a** and **b** which has 20 and 10 elements in each respectively.
2. Create a new array **c** by concatenating(combining) them. Put the second array **b** to the tail of the first array **a**.
3. Find **maximum** and **minimum** elements within the new array **c** and display them with their index numbers(**position**).
4. Display the elements of the new array **c** in a reverse order.

#include<stdio.h>

void main(void)

{

 int a[20] , b[10], int c[30];

 int max, min, maxp, minp;

 int cnt, i;

 printf("Enter the elements of the array a : \n");

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

 scanf("%d ",a[i]);

 printf("Enter the elements of the array b : \n");

 for(i=0;i<10;i++)

 scanf("%d ",b[i]);

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

 c[i]=a[i];

 cnt=i;

 for(i=0;i<10;i++)

 { c[cnt]=b[i];

 cnt++;

 }

 max=c[0]; min=c[0]; maxp=0; minp=0;

 for(i=1;i<30;i++)

 { if (max<c[i]){ max=c[i];

 maxp=i+1;}

 if (min>c[i]){ min=c[i];

 minp=i+1;}

 }

 printf("Maximum element in array c is:% and its position is:%d\n", max,maxp);

 printf("Minimum element in array c is:% and its position is:%d\n", min,minp);

 for(i=29;i>=0;i--)

 printf("%d ",c[i]);

}

Question 8) Following program reads heights and weights of **n** number of student and finds and display **average** of **height** values and **average** of **weigh**t values from the monitor.

Write the same program using functions(main and other functions).

**Do not declare global variables.**

#include <stdio.h>

#define MAXSIZE 100

int main()

{

int height[MAXSIZE];

int weight[MAXSIZE];

float avrg1,avrg2;

int t , i , n;

scanf("%d",&n);

for(i=0;i<n;i++)

scanf("%d",&height[i]);

for(i=0;i<n;i++)

scanf("%d",&weight[i]);

t=0;

for(i=0;i<n;i++)

t+=height[i];

avrg1=float(t/n);

t=0;

for(i=0;i<n;i++)

t+=weight[i];

avrg2=float(t/n);

printf("Average of Height = %.2f and Average of Weight = %.2f",avrg1,avrg2);

return 0;

##### Solution

#include <stdio.h>

#define MAXSIZE 100

**void getdata(int x[],int m)**

{

int i;

for(i=0;i<m;i++)

scanf("%d",&x[i]);

}

**float findaverage(int x[],int m)**

{

int i, t=0;

for(i=0;i<m;i++)

t+=x[i];

return float(t/m);

}

**int main()**

{

int height[MAXSIZE];

int weight[MAXSIZE];

float avrg1 , avrg2;

int t , i , n;

scanf("%d",&n);

**getdata**(height , n);

**getdata**(weight , n);

avrg1=**findaverage**(height , n);

avrg2=**findaverage**(weight , n);

printf("Average of Height = %.2f and Average of Weight = %.2f",avrg1,avrg2);

return 0;

}

**Q9)** Wite a C program and define the following initialization in a main program and call two functions **findmaxa**, and **findmaxb** with the array arguments **a** and **b** respectively and **find greatest element in matrix a using function findmaxa and find greatest element in array b using function findmaxb** and return its value back to the main program and **list the difference** of these two numbers(greatest values) in the main program.

Initialize following **real** numbers into two dimensional matrix **a (3 x 4 ),**

 **3.2 , 5.8 , 4.0 , 0.0, 6.4 , 10.5, -8.4 , 6.5 , -14.5 , 5.6 , 0.0, 7.2**

and initialize following **integer** numbers into one dimensional array **b**

**88 , 77 , 12 , 96 , 51 , 78 , 12**

Solution

**#include <stdio.h>**

**float findmaxa(float x[][4] , int k , int m)**

**{**

**int i,j;**

**float max;**

**max = x[0][0];**

**for(i=0; i<k; i++)**

 **for(j=1; j<m; j++)**

 **if (x[i][j]>max) max=x[i][j];**

**return max;**

**}**

**int findmaxb(int x[],int k)**

**{**

**int i,max;**

**max = x[0];**

**for(i=0; i<k; i++)**

 **if (x[i]>max) max=x[i];**

**return max;**

**}**

**int main()**

**{**

 **float a[3][4]={3.2,5.8,4.0,0.0,6.4,10.5,-8.4,6.5,-14.5,5.6,0.0,7.2};**

 **int b[7]={88,77,12,96,51,78,12};**

 **float m;**

 **int n;**

 **m=findmaxa(a,3,4);**

 **n=findmaxb(b,7);**

 **printf("Diffrenec= %.1f",(float)m-n);**

 **return 0;**

 **}**

**Q1) (12 pts)** Find the output of each of the following C code segments. In each case write your final answer in the corresponding boxes on the right:

**a)** **int x=2, j=8, n=5, m=3;**

**m = 3 \* (n = 3);**

m = 27 n = 2 j = 29

**m \*= n--;**

**j = m + n;**

**printf("m=%d n=%d j=%d\n", m, n, j);**

**b) int x1=1, x2=2, x3=3;**

x1 = 0

 **x1 /= x2 = x3 = x1 \* x2 + x3;**

 **printf(“x1=%d”, x1);**

**c) int x1 , x2 , x3;**

x1 = 3

**x1 = x2 = x3 = 3;**

**x1 %= (x2+x3) ;**

**printf(“x1=%d”, x1);**

x1 = 1

**d) int x1=1, x2=2, x3=3;**

 **x1 = x3 != x2 < x3 \* x2;**

 **printf(“x1=%d”, x1 );**

**e) int x1=1, x2=2, x3=3, x4;**

x4 = 1

 **x4 = --x1 || -- x2 && x3++;**

 **printf(“x4=%d”, x4 );**

**f) int x1=0, x2=1, x3=2, x4;**

x4 = 2

 **x4 = x1++ ? x2-- : x3--;**

 **printf(“x4=%d”, x4 );**

**Q2) (12 pts)** **)** Rewrite the following C program fragment using only **if - else** statements in place of the **switch** statement:

 **if (ch == ‘p’)**

 **{ x+=2; y += 3;**

 **x \*= 4; y\*=5; }**

 **else if (ch == ‘q’)**

 **{ x \*= 4; y\*=5; }**

 **else**

 **{ x++; y++; }**

**switch(ch)**

**{**

 **case ‘p’: x+=2; y += 3;**

 **case ‘q’: x \*= 4; y\*=5; break;**

 **default : x++; y++; break;**

**}**

**Q10)** Give the outputs for each of the following C program fragments in the corresponding boxes on the right:

**a) x = -1 y = 4** **k = -3 j = 0**

**int x = -3, y = 0, k, j;**

**for(k = j = -3; x += k < j, ++j; y += 2); /\*semicolon here!\*/**

**printf("x = %d y = %d k = %d j = %d\n", x, y, k, j);**

**-------------------------------------------------------**

**b)**

 **int x = 0, z = -7;**

**do Today ?**

 **{ How**

 **z++; Are you**

 **if(x) Today ?**

 **{ How**

 **printf("How \n");**

 **if(z == x) break;**

 **printf("Are you \n");**

 **}**

 **x -= 2;**

 **printf("Today ? \n");**

**}while(z < -3);**

**-------------------------------------------------------**

**c) j = 7 k = 3 x = 12**

 **int x = 0, j, k;**

**for(j = 1; j < 6; j += 2)**

 **for(k = 1; k < 3; k++) x += j/k; /\*semicolon here!\*/**

**printf("j = %d k = %d x = %d\n", j, k, x);**

**-------------------------------------------------------**

**d)**

**int x = 0, z = -7;**

**do Today ?**

 **{ How**

 **z++; How**

 **if(x) Are you**

 **{ Today ?**

 **printf("How \n");
 if(z+3 == x) continue;**

 **printf("Are you \n");**

 **}**

 **x -= 2;**

 **printf("Today ? \n");**

 **}while(z < -4);**

**e)**

 **int x = 2, y = 1, k;**

 **while(x <= 5)**

 **{**

 **x += 3/x;**

 **for(k=0; k<4; k++)**

 **{**

 **y++;**

 **if(y%2 == 0) continue;**

 **else break;**

 **y =3; x = 6 y = 7**

 **}**

 **x++;**

 **}**

 **printf("x = %d y = %d\n", x, y);**

**-------------------------------------------------------

f)**

 **int x = 0, y = -4, k;**

 **x = 1 y = -4**

**for(k=0; k<3; k++) Hello**

 **{ x = 2 y = -2**

 **while(x++ && (y += 2)) x = 3 y = 0**

**{**

**printf("Hello\n");**

**if(x) break;**

**}**

 **printf("x = %d y = %d\n", x, y);**

 **}**

**-------------------------------------------------------**

 **x = 3 y = 1**

**g) x = 4 y = 1**

**int x = 8, y = 2; x = -1 y = 0**

 **while(x%2 ? ++x :(x -= 5, --y))**

 **printf("x = %d y = %d\n", x, y);**

 **printf("x = %d y = %d\n", x, y);**

**-------------------------------------------------------**

**Question 1** (5 Points). What is the output of the following program? (Give the output in the box on the right)

**#include <stdio.h>**

5 2 2

4 3 1

3 4 0

**int main()**

**{**

 **int a=6,b=1,c=3;**

 **while(a<b<c)**

 **{**

 **switch(a<b<c)**

 **{**

 **default : ++a;**

 **continue;**

 **case 1 : --a;--c;**

 **case 0 : ++b;**

 **break;**

 **}**

 **printf("%d %d %d\n",a,b,c);**

 **}**

**}**

**Question 2** (8 Points). What is the output of the following program? (Give the output in the box on the right)

res=15

res=15

res=12

**#include <stdio.h>**

**int main()**

**{**

 **int a=0,b=0,c=15;**

 **do**

 **{**

 **printf("res=%d\n",a+b+c);**

 **}while(++a,b=a+1,c-=a+b);**

**}**

**Question 3** (5 Points). The following program is supposed to display

 \*\*\*\*\*

 \* \*

 \* \*

 \* \*

 \*\*\*\*\*

as the output but one statement is missing. Fill the missing statement into **only** **one** of the spaces given below.

**#include <stdio.h>**

**int main()**

**{**

**int i;**

 **for(i=0;i<5;i++)**

 **{**

 **switch(i)**

 **{ case 0: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_;**

 **case 4: printf("\*\*\*\*\*\n");** break **;**

 **default: printf("\* \*\n"); \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_;**

 **}**

 **}**

**}**