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Q3 → Marks on cover page is 10 however at the question (Pg 7) 11 marks have been awarded for it.

ESC101: Fundamentals of Computing (Mid Semester Exam)

18 September, 2015 (1-3pm)

Total Points 65

Total Number of Pages: 12

Instructions

1. Read these instructions carefully.
2. Write you name, section and roll number on all the pages of the answer book, **including the ROUGH pages.**
3. Write the answers cleanly in the space provided. Space is given for rough work in the answer book.
4. Using pens (blue/black ink) and not pencils. Do not use red pens for answering.
5. Do not exchange question books or change the seat after obtaining question paper.
6. Even if no answers are written, the answer book has to be returned back with name and roll number written.
7. Sign the attendance sheet.

Question	Points	Score
1	13	12
2	10	10
3	12	10+1 = 11
4	10	10
5	10	10
6	10	10
Total:	65	63+1 = 64

good :)

I PLEDGE MY HONOUR THAT DURING THE EXAMINATION I HAVE NEITHER GIVEN NOR RECEIVED ASSISTANCE.

M Abbas

.....

Signature

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Question 1. (a) (7 points) Consider the following C declarations and assignments.

```
int x,y; float z; char ch;
x=1, y=2, z=4, ch='5';
```

Using the above write the output of each of the following program snippets. (Note: Consider each snippet independent of the other.)

Statement	Output
`printf("%d", 4/y+x );`	3
`printf("%2.2f", x/y*0.5 );`	0.00
`printf("%c", x*=y+ch );`	7
`printf("%d", y+++-x );`	1
`printf("%d", y+++--x );`	2
`printf("%d", (z, !z) );`	0
`printf("%d", z>y>x );`	0

(b) (6 points) Consider the following code segment.

```
int x=2, y, z=1 ;
for( ; x*x<=y ; x++ )
    y%x ? 1 : (z=0) ;
z ? printf("YES") : printf("NO") ;
```

What is the output of the above code segment for the following values of y?

y = 169; NO

y = 173; YES

y = 179; YES

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Question 2. (10 points) Complete the following program which computes the largest sum of a pair of numbers in an array of size 10. For example, if the array consists of the numbers {4, 3, 7, 6, 5, 8, 2, 4, 9, 3} then the output of the program should be 17.

```
#include<stdio.h>

int sumPair(int a[], int n ) {
  int i,x,y;

  if (a[0] > a[1] ) {
      x = a[0];
      y = a[1];
  }
  else {
      x = a[1];
      y = a[0];
  }

  for (i = 2; i<n; i++ ) {
      if (a[i] > x) {
                  y = x;
                  x = a[i];
      }
      else if (a[i] >=y && a[i] != y )

                  y = a[i];
  }
  return (x+y) ;
}

int main() {
  int n, i, c[10] ;

  printf("Input 10 numbers\n");
  for(i=0;i<10;i++)

    scanf("%d", c+i );

  printf("Sum=%d",sumPair(c,10));

  return 0;
}
```

10

1 2 2

1 2 3 2 4 3 1 2 2 2

4 x 3 2 1 x 1 2 3 2

2, 4

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Question 3. (12 points) Ceepee has learnt C programming not very long ago. Ceepee wants to put his skills to test by writing a program to compute the gcd (greatest common divisor) of a given array of integers.

Eg. $\gcd\{1,2,4\} = 1$. $\gcd\{-10,0,240,-1000\} = 10$.

He attempted to debug the program and could now use your help. His program is produced below. He has a suspicion that something is wrong in the specified line numbers. Your task is to either give the correct statement, with minimal changes, or report OK. (Note: Changing a statement that is already correct, or changing a statement by an unnecessary amount, will be penalized.)

```
1  #include <stdio.h>
2  define S 4 //S is the array size
3
4  void gcd(int x, int y) {
5      int r;
6
7      //make them non-negative
8      x = (x<0)? x:-x;
9      y = (y<0)? -y:y;
10
11     if(x<y) {
12         r=x;
13         x=y;
14         y=r;
15     }
16
17     //handle the case y=0
18     if(!y) return x;
19
20     while (r == x%y) {
21         x = y;
22         y = r;
23     }
24     return y;
25 }
26
27 int main() {
28     int A[];
29     int g, i;
30
31     for (i = 0; i <= S; i++)
32         scanf("%d", A+i);
33
34     for (g = A[0]; i < S; i++) {
35         g = gcd(g, *(A+i));
36         /* printf("gcd till i=%d is: %d\n", i, g);
37     }
38
39     printf("The gcd is: %d\n", g);
40
41     return 0;
42 }
```

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Suspicion in	Your response
line 2	#define S 4 (;) ✗
line 4	int gcd(int x, int y){ ✓
line 8	x = (x<0)?-x:x; ✓
line 18	if (!y) return x; ✓
line 20	while(r = x%y){ ✓
line 28	int A[S]; ✓
line 31	for(i=0; i<S; i++) ✓
line 32	OK ✓
line 34	for(g=A[0], i=1; i<S; i++){ ✓
line 35	OK ✓
line 36	/* gcd till ith index is g */ ✓
line 39	printf("The gcd is : %d\n", g); ✓

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Question 4. (10 points) Ceepee again managed to write a convoluted code to test name scopes in C. Help I figure out the five output values.

```
#include <stdio.h>

int x=0;

int f1(){
    return x++;
}

int f2(){
    int x=-1;
    return ++x;
}

int f3(){
    int x=100, y=10;
    return f1();
}

int f4(){
    static int y=0;
    return y+=x;
}

int main() {
    int x=-20, y=-10;

    printf("%d\n", f1() );
    printf("%d\n", f4() );
    printf("%d\n", f2() );
    printf("%d\n", f3() );
    {
        int x=-1;
        printf("%d\n", f4() );
    }

    return 0;
}
```

Neatly fill in the output in the box.

OUTPUT:

0
1
0
1
3

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Question 5. (10 points) Complete the following program which does the following: Given an array of 10 positive integers, replace every element by the largest number to its right in the array. Since the last number in the array does not have any other number to its right, replace the last number by -1.

For example, if the array consists of the numbers {4, 3, 7, 6, 5, 8, 9, 2, 4, 3} then the output of the program should be {9, 9, 9, 9, 9, 9, 4, 4, 3, -1}.

```
#include <stdio.h>

void modifyArray(int a[], int n) {
  int i,t,m;

  m = a[n-1];

  a[n-1] = -1;

  for(i = n-2; i >=0 ; i--) {

      t = a[i];

      a[i] = m;

      if(m <t ) m = t;
  }
}

int main() {
  int i, x[10];

  printf("Input 10 numbers\n");
  for(i=0;i<10;i++)
  scanf("%d", x+i);

  modifyArray(x,10);

  printf ("Modified array \n");
  for (i=0;i<10;i++)

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

  printf("\n");

  return 0;
}
```

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