

October 15, 2009

Name _____

SOLUTION

ECE264 Advanced C Programming Exam 1

Solve the following problems. The number of points for each problem is shown next to the problem and in the table below. The outcomes corresponding to each question are also shown. Use only the space provided to solve each problem.

Problem	Points	Outcome
1 (a)	/ 10	
(b)	/ 10	
2 (a)	/ 10	
(b)	/ 10	
3 (a)	/ 15	2
(b)	/ 15	
(c)	/ 15	
(d)	/ 15	
Total	/ 100	

Problem 1 (20 points)

Specify what the following program will print for the input given in part (a), and for the input given in part (b).

```
#include <stdio.h>
#include <assert.h>
#define NA 100

int main()
{
    int a[NA],na;
    int done,num,ns;
    char ch;
    FILE *pf;
    void printa(int *, int);

    pf=fopen("inp1","r");
    for(done=0,na=0;!done;)
    {
        ns=fscanf(pf,"%d",&num);
        if(ns==EOF) done=1;
        else if(ns==1)
        {
            assert(na<NA);
            a[na++]=num;
        }
        else fscanf(pf,"%c",&ch);
    };
    fclose(pf);

    printa(a,na);
}
```

```
void printa(int *a, int na)
{
    int i;
    int count(int);

    for(i=0;i<na;i++) printf("\n%d %d",a[i],count(a[i]));
    printf("\n");
}

int count(int num)
{
    int i;

    for(i=0;num!=0;i++) num/=10;
    return(i);
}
```

- (a) The file "inp1" contains:

123 45

The program will print:

123 3

45 2

- (b) The file "inp1" contains:

123abc45 d-67*8=900

The program will print:

123 3

45 2

-67 2

8 1

900 3

Problem 2 (20 points)

Specify what the following program will print for the input given in part (a), and for the input given in part (b).

```
#include <stdio.h>
#include <stdlib.h>
#include <assert.h>

int main()
{
    int *a,na,i;
    int *arrayfunc1(int *);
    void arrayfunc2(int *, int);
    int arrayfunc3(int *, int);

    a=arrayfunc1(&na);
    arrayfunc2(a,na);
    na=arrayfunc3(a,na);
    arrayfunc2(a,na);
    printf("\n");
}

void arrayfunc2(int b[], int size)
{
    int i;

    for(i=0;i<size;i++) printf(" %d",b[i]);
    printf("\n");
}

int *arrayfunc1(int *pa)
{
    int *a,i;

    scanf("%d",pa);
    a=(int *)malloc((*pa)*sizeof(int));
    assert(a!=NULL);
    for(i=0;i<*pa;i++) a[i]=i;
    return(a);
}
```

```
int arrayfunc3(int b[], int size)
{
    int i,j;

    for(i=0,j=0;i<size;i++)
        if(b[i]%2==size%2)
            b[j++]=b[i];

    return(j);
}
```

(a) The input is: 5

The program will print:

```
0 1 2 3 4
1 3
```

(b) The input is: 6

The program will print:

```
0 1 2 3 4 5
0 2 4
```

Problem 3 (60 points)

For each one of the programs in parts (a), (b), (c) and (d), specify what the program will print.

(a)

```
#include <stdio.h>
#include <stdlib.h>
#define NA 5

struct array
{
    int a[NA],na;
};

int main(void)
{
    int i;
    struct array arr;
    void fillarray(struct array),printarray(struct array);

    for(i=0;i<NA;i++) arr.a[i]=0;
    arr.na=NA;
    fillarray(arr);
    printarray(arr);
}

void fillarray(struct array arr)
{
    int i;
    for(i=0;i<arr.na;i++) arr.a[i]=i;
}

void printarray(struct array arr)
{
    int i;
    printf("\n");
    for(i=0;i<arr.na;i++) printf(" %d",arr.a[i]);
    printf("\n");
}
```

The program will print:

0 0 0 0 0

(b)

```
#include <stdio.h>
#include <stdlib.h>
#define NA 5

struct array
{
    int a[NA],na;
};

int main(void)
{
    int i;
    struct array arr;
    void fillarray(struct array *),printarray(struct array);

    for(i=0;i<NA;i++) arr.a[i]=0;
    arr.na=NA;
    fillarray(&arr);
    printarray(arr);
}

void fillarray(struct array *parr)
{
    int i;

    for(i=0;i<parr->na;i++) parr->a[i]=i;
}

void printarray(struct array arr)
{
    int i;

    printf("\n");
    for(i=0;i<arr.na;i++) printf(" %d",arr.a[i]);
    printf("\n");
}
```

The program will print:

0 1 2 3 4

(c)

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

#define NA 5

struct array
{
    int a[NA],na;
};

int main(void)
{
    int i;
    struct array arr,fillarray(struct array);
    void printarray(struct array);

    for(i=0;i<NA;i++) arr.a[i]=0;
    arr.na=NA;
    arr=fillarray(arr);
    printarray(arr);
}

struct array fillarray(struct array arr)
{
    int i;
    for(i=0;i<arr.na;i++) arr.a[i]=i;
    return(arr);
}

void printarray(struct array arr)
{
    int i;
    printf("\n");
    for(i=0;i<arr.na;i++) printf(" %d",arr.a[i]);
    printf("\n");
}
```

The program will print:

0 1 2 3 4

(d)

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

#define NA 5
#define NR 3

struct array
{
    int a[NA],na;
};

int main(void)
{
    int i,j;
    struct array arr[NR];
    void fillarray(struct array *, int),printarray(struct array);

    for(i=0;i<NR;i++)
    {
        for(j=0;j<NA;j++) arr[i].a[j]=0;
        arr[i].na=NA;
    };

    for(i=0;i<NR;i++)
    fillarray(arr+i,10*i);

    for(i=0;i<NR;i++)
    printarray(arr[i]);
}

void fillarray(struct array *parr, int start)
{
    int i;
    for(i=0;i<parr->na;i++) parr->a[i]=start+i;
}

void printarray(struct array arr)
{
    int i;
    printf("\n");
    for(i=0;i<arr.na;i++) printf(" %d",arr.a[i]);
    printf("\n");
}
```

The program will print:

0 1 2 3 4

10 11 12 13 14

20 21 22 23 24