ECE264 Advanced C Programming
TTh 7:30-8:20am
Exam 3

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 problem are also shown. Use only the space provided to solve each problem.

<table>
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<th>Problem</th>
<th>Points</th>
<th>Outcome</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>/ 50</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>/ 25</td>
<td></td>
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<tr>
<td>3</td>
<td>/ 15</td>
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<tr>
<td>4</td>
<td>/ 10</td>
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<td>Total</td>
<td>/ 100</td>
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</table>
Problem 1 (50 points)

The following program is run in a directory that contains the files

    a.out
    list
    p1.c
    story.txt

Using the grid provided for this purpose, specify what the program will print. Use one square of the grid per character that the program prints. Your answer should be accurate with respect to all the characters including spaces and new lines.

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#define MAXFILES 100
#define MAXNAME 100

int main()
{
    char filename[MAXNAME], pref[MAXNAME], suff[MAXNAME];
    int maxname, i;
    FILE *pf;

    system("ls > list");

    printf("\npart1\n");
    pf=fopen("list","r");
    while(fscanf(pf,"%s",filename)==1)
    {
        suff[0]=0;
        sscn(fname,"[.][.]*",pref,suff);
        printf("\n%-8s %-4s %-4s",filename,pref,suff);
    }
    fclose(pf);

    printf("\n\npart2\n");
    pf=fopen("list","r");
    while(fscanf(pf,"%s",filename)==1)
    printf("\n%-10s %2d",filename,strlen(filename));
    fclose(pf);
```
printf("\n\npart3")
pf=fopen("list","r")
for(maxname=0;fscanf(pf,"%s",filename)==1;) 
if(strlen(filename)>maxname) maxname=strlen(filename);

fseek(pf,0,0);
while(fscanf(pf,"%s",filename)==1)
{
    printf("\n%s",filename);
    for(i=strlen(filename);i<10;i++) printf(" ");
    printf("%2d",strlen(filename));
}
fclose(pf);

printf("\n\npart4")
fprintf(stdout,"\n%5.5s","*****");
fprintf(stdout,"\n%4.3s","*****");
fprintf(stdout,"\n%3.1s","*****");

printf("\n");}
The program will print:

| part 1 | a.out | a.out | list | list | p1.c | p1.c | story.txt | story.txt |
|        |       |       |      |      |      |      |           |           |
| part 2 | a.out |       | list | list | p1.c | p1.c | story.txt | story.txt |
| part 3 | a.out |       | list | list | p1.c | p1.c | story.txt | story.txt |
| part 4 |       |       |      |      |      |      |           |           |
|        | ***   |       |      |      |      |      |           |           |
|        |       |       |      |      |      |      |           |           |
Problem 2 (25 points)

A program resides in two files called part1.c and part2.c. Type declarations are included in a file called declar.h. Both part1.c and part2.c start with the directive

#include "declar.h"

Complete the following makefile so as to create an executable file called exec.

exec: part1.o part2.o
    cc -o exec part1.o part.o

part1.o: part1.c declar.h
    cc -c part1.c

part2.o: part2.c declar.h
    cc -c part2.c
**Problem 3 (15 points)**

Specify what the following program will print.

```c
#include <stdio.h>

#define INCR(x,y,n) max(x,y,n); printarr(y,n)
#define DECR(x,y,n) min(x,y,n); printarr(y,n)

#define N 4

int main(void)
{
    int a[N]={3,1,4,2}, b[N];
    void max(int *, int *, int);
    void min(int *, int *, int);
    void printarr(int *, int);

    INCR(a,b,N);
    DECR(a,b,N);
    printf("n");
}

void max(int a[], int b[], int n)
{
    int i, max;

    for(i=1, max=a[0]; i<n; i++)
        if(a[i]>max) max=a[i];

    for(i=0; i<n; i++)
        b[i]=max;
}

void min(int a[], int b[], int n)
{
    int i, min;

    for(i=1, min=a[0]; i<n; i++)
        if(a[i]<min) min=a[i];

    for(i=0; i<n; i++)
        b[i]=min;
}
void printarr(int a[], int n)  
{  
    int i;  

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

The program will print:

```
|   |
|   |
```
Problem 4 (10 points)

Specify what the following program will print for the input given below. Be as specific as you can. However, if it is not possible to determine a particular value do not guess what it is. Instead, write a short description of the value. For example, if you think the program prints four 1’s followed by an integer between 5 and 50, write:

1 1 1 1 x (x is an integer in the range [5,50])

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

#define N 5

int main(void)
{
    int *a;
    int i,j,k;

    a=NULL;
    for(i=0;i<N;i++)
    {
        scanf("%d",&j);
        a=(int *)realloc(a,(i+1)*sizeof(int));
        assert(a!=NULL);
        for(k=0;k<j;k++) a[k]=0;
        a[j]=10*drand48();
        printf("na:");
        for(k=0;k<=j;k++) printf(" %d",a[k]);
    }
    printf("n");
}
```

The input to the program is:

3 5 2 4 1

The program will print:

```
a: 0 0 0 r1
a: 0 0 0 0 0 r2
a: 0 0 r3
a: 0 0 0 0 r4
a: 0 0 0 0 r5
```

r1 is an integer in [0,10] for

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