Name : _____ Circle one: (Morning Section) (Afternoon Section) CS 100 Exam 3 - Tracing

Give the output of the following C program when run with

`./a.out ALABAMA ATLANTA`

```
#include <stdio.h>
void g(char a[], int c[]) {
    for (char *ptr=a; *ptr!='\0'; ptr++)
        c[*ptr -'A']++;
}
void p(int tag, int c1[], int c2[]) {
    printf("%d: ", tag);
    for (int i=0; i<26; i++) {
        if (tag==1) {
            if (c1[i]==0 && c2[i]>0)
                printf("%c", 'A'+i);
        }
        else if (tag==2) {
            if (c1[i]>0 && c2[i]==0)
                printf("%c", 'A'+i);
        }
        else if (tag==3) {
            if (c1[i]>0 && c2[i]>0)
                printf("%c", 'A'+i);
        }
    }
    printf("\n");
}
int main(int argc, char *argv[]) {
    int f1[26]={0}, f2[26]={0};
    g(argv[1], f1);
    g(argv[2], f2);
    p(1, f1, f2);
    p(2, f1, f2);
    p(3, f1, f2);
    return 0;
}
```

Assume the file `data.txt` contains the data as shown below, give the output of the following C program when run with

`./a.out data.txt`

```
#include <stdio.h>
#include <stdlib.h>
int *r(FILE *fp, int n)
{
        int *p=malloc(n*sizeof(int));
        for (int i=0; i<n; i++)
                fscanf(fp, "%d", p+i);
        return p;
}
int main(int argc, char *argv[])
{
        FILE *fp=fopen(argv[1], "r");
        int n;
        fscanf(fp, "%d", &n);
        int **a=malloc(n*sizeof(int *));
        for (int i=0; i<n; i++) {
                a[i]=r(fp, n);
        }
        for (int i=0; i<n; i++) {
                int t=0;
                for (int j=0; j<n-i; j++) {
                        t=t+a[i+j][j];
                }
                printf("%d: %d\n", i, t);
        }
        return 0;
}
```

data.txt:

```
5
2 4 6 2 1
3 3 5 4 3
5 3 5 4 2
1 3 1 1 4
3 3 5 1 1
```

Name : _____ Circle one: (Morning Section) (Afternoon Section) CS 100 Exam 3 - Tracing

Give the output of the following C program when run with

`./a.out MISSISSIPPI PHILLY`

```
#include <stdio.h>
void g(char a[], int c[]) {
    for (char *ptr=a; *ptr!='\0'; ptr++)
        c[*ptr -'A']++;
}
void p(int tag, int c1[], int c2[]) {
    printf("%d: ", tag);
    for (int i=0; i<26; i++) {
        if (tag==1) {
            if (c1[i]==0 && c2[i]>0)
                printf("%c", 'A'+i);
        }
        else if (tag==2) {
            if (c1[i]>0 && c2[i]==0)
                printf("%c", 'A'+i);
        }
        else if (tag==3) {
            if (c1[i]>0 && c2[i]>0)
                printf("%c", 'A'+i);
        }
    }
    printf("\n");
}
int main(int argc, char *argv[]) {
    int f1[26]={0}, f2[26]={0};
    g(argv[1], f1);
    g(argv[2], f2);
    p(1, f1, f2);
    p(2, f1, f2);
    p(3, f1, f2);
    return 0;
}
```

Assume the file `data.txt` contains the data as shown below, give the output of the following C program when run with

`./a.out data.txt`

```
#include <stdio.h>
#include <stdlib.h>
int *r(FILE *fp, int n)
{
        int *p=malloc(n*sizeof(int));
        for (int i=0; i<n; i++)
                fscanf(fp, "%d", p+i);
        return p;
}
int main(int argc, char *argv[])
{
        FILE *fp=fopen(argv[1], "r");
        int n;
        fscanf(fp, "%d", &n);
        int **a=malloc(n*sizeof(int *));
        for (int i=0; i<n; i++) {
                a[i]=r(fp, n);
        }
        for (int i=0; i<n; i++) {
                int t=0;
                for (int j=0; j<n-i; j++) {
                        t=t+a[i+j][j];
                }
                printf("%d: %d\n", i, t);
        }
        return 0;
}
```

data.txt:

```
5
3 5 2 5 3
1 2 5 2 5
3 2 2 3 6
4 1 3 1 4
5 3 2 4 3
```