# ASSIGNMENT III

```
// Question 1. Write a program to find the maximum and
minimum element in an array.
#include <stdio.h>
int main() {
    int a[100],n,i,mx,mn;
    scanf("%d",&n);
    for(i=0;i<n;i++) scanf("%d",&a[i]);
    mx=mn=a[0];
    for(i=1;i<n;i++) {
        if(a[i]>mx) mx=a[i];
        if(a[i]<mn) mn=a[i];
    }
    printf("%d %d",mx,mn);
    return 0;
}
```

```
// Question 2. Write a program to search for an element in an
array (linear search).
#include <stdio.h>
int main() {
    int a[100],n,x,i,f=0;
    scanf("%d",&n);
    for(i=0;i<n;i++) scanf("%d",&a[i]);
    scanf("%d",&x);
    for(i=0;i<n;i++) if(a[i]==x) f=1;
    if(f) printf("found");
    else printf("not found");
    return 0;
```

```
}

// Question 3. Write a program to reverse an array.
#include <stdio.h>
int main() {
    int a[100],n,i;
    scanf("%d",&n);
    for(i=0;i<n;i++) scanf("%d",&a[i]);
    for(i=n-1;i>=0;i--) printf("%d ",a[i]);
    return 0;
}

// Question 4. Write a program to copy one array to another.
#include <stdio.h>
int main() {
    int a[100],b[100],n,i;
    scanf("%d",&n);
    for(i=0;i<n;i++) scanf("%d",&a[i]);
    for(i=0;i<n;i++) b[i]=a[i];
    for(i=0;i<n;i++) printf("%d ",b[i]);
    return 0;
}

// Question 5. Write a program to count even and odd elements
in an array.
#include <stdio.h>
int main() {
    int a[100],n,i,e=0,o=0;
    scanf("%d",&n);
    for(i=0;i<n;i++) {
```

```
        scanf("%d",&a[i]);
        if(a[i]%2==0) e++;
        else o++;
    }
    printf("%d %d",e,o);
    return 0;
}
```

// Question 6. Write a program to count positive, negative, and zero values in an array.

```
#include <stdio.h>
int main() {
    int a[100],n,i,p=0,ne=0,z=0;
    scanf("%d",&n);
    for(i=0;i<n;i++) {
        scanf("%d",&a[i]);
        if(a[i]>0) p++;
        else if(a[i]<0) ne++;
        else z++;
    }
    printf("%d %d %d",p,ne,z);
    return 0;
}
```

// Question 7. Write a program to sort an array using bubble sort.

```
#include <stdio.h>
int main() {
    int a[100],n,i,j,t;
    scanf("%d",&n);
```

```
    for(i=0;i<n;i++) scanf("%d",&a[i]);
    for(i=0;i<n-1;i++)
        for(j=0;j<n-i-1;j++)
            if(a[j]>a[j+1]) { t=a[j]; a[j]=a[j+1];
a[j+1]=t; }
    for(i=0;i<n;i++) printf("%d ",a[i]);
    return 0;
}

// Question 8. Write a program to sort an array using
selection sort.
#include <stdio.h>
int main() {
    int a[100],n,i,j,t,m;
    scanf("%d",&n);
    for(i=0;i<n;i++) scanf("%d",&a[i]);
    for(i=0;i<n-1;i++) {
        m=i;
        for(j=i+1;j<n;j++) if(a[j]<a[m]) m=j;
        t=a[i]; a[i]=a[m]; a[m]=t;
    }
    for(i=0;i<n;i++) printf("%d ",a[i]);
    return 0;
}

// Question 9. Write a program to perform binary search on a
sorted array.
#include <stdio.h>
int main() {
    int a[100],n,i,x,l=0,h,m;
```

```
    scanf("%d",&n);
    for(i=0;i<n;i++) scanf("%d",&a[i]);
    scanf("%d",&x);
    h=n-1;
    while(l<=h) {
        m=(l+h)/2;
        if(a[m]==x) { printf("found"); return 0; }
        else if(a[m]<x) l=m+1;
        else h=m-1;
    }
    printf("not found");
    return 0;
}

// Question 10. Write a program to merge two sorted arrays
into a single sorted array.
#include <stdio.h>
int main() {
    int a[100],b[100],c[200],n,m,i=0,j=0,k=0;
    scanf("%d%d",&n,&m);
    for(i=0;i<n;i++) scanf("%d",&a[i]);
    for(j=0;j<m;j++) scanf("%d",&b[j]);
    i=j=k=0;
    while(i<n&&j<m) {
        if(a[i]<b[j]) c[k++]=a[i++];
        else c[k++]=b[j++];
    }
    while(i<n) c[k++]=a[i++];
    while(j<m) c[k++]=b[j++];
    for(i=0;i<k;i++) printf("%d ",c[i]);
```

```
    return 0;
}
// Question 11. Write a program to remove duplicates from an
array.
#include <stdio.h>
int main() {
    int a[100],n,i,j,k;
    scanf("%d",&n);
    for(i=0;i<n;i++) scanf("%d",&a[i]);
    for(i=0;i<n;i++) {
        for(j=i+1;j<n;) {
            if(a[i]==a[j]) {
                for(k=j;k<n-1;k++) a[k]=a[k+1];
                n--;
            } else j++;
        }
    }
    for(i=0;i<n;i++) printf("%d ",a[i]);
    return 0;
}

// Question 12. Write a program to count frequency of each
element in the array.
#include <stdio.h>
int main() {
    int a[100],b[100],n,i,j,c;
    scanf("%d",&n);
    for(i=0;i<n;i++) scanf("%d",&a[i]);
    for(i=0;i<n;i++) {
        c=1;
```

```
        if(b[i]) continue;
        for(j=i+1;j<n;j++) {
            if(a[i]==a[j]) { c++; b[j]=1; }
        }
        printf("%d %d\n",a[i],c);
    }
    return 0;
}
```

// Question 13. Write a program to find the second largest element in an array.

```
#include <stdio.h>
int main() {
    int a[100],n,i,f,s;
    scanf("%d",&n);
    for(i=0;i<n;i++) scanf("%d",&a[i]);
    f=s=-100000;
    for(i=0;i<n;i++) {
        if(a[i]>f) { s=f; f=a[i]; }
        else if(a[i]>s && a[i]!=f) s=a[i];
    }
    printf("%d",s);
    return 0;
}
```

// Question 14. Write a program to find the second smallest element in an array.

```
#include <stdio.h>
int main() {
    int a[100],n,i,f,s;
```

```
    scanf("%d",&n);
    for(i=0;i<n;i++) scanf("%d",&a[i]);
    f=s=100000;
    for(i=0;i<n;i++) {
        if(a[i]<f) { s=f; f=a[i]; }
        else if(a[i]<s && a[i]!=f) s=a[i];
    }
    printf("%d",s);
    return 0;
}

// Question 15. Write a program to add two matrices.
#include <stdio.h>
int main() {
    int a[10][10],b[10][10],c[10][10],r,c1,i,j;
    scanf("%d%d",&r,&c1);
    for(i=0;i<r;i++) for(j=0;j<c1;j++) scanf("%d",&a[i][j]);
    for(i=0;i<r;i++) for(j=0;j<c1;j++) scanf("%d",&b[i][j]);
    for(i=0;i<r;i++) {
        for(j=0;j<c1;j++) {
            c[i][j]=a[i][j]+b[i][j];
            printf("%d ",c[i][j]);
        }
        printf("\n");
    }
    return 0;
}

// Question 16. Write a program to subtract two matrices.
#include <stdio.h>
```

```
int main() {
    int a[10][10],b[10][10],c[10][10],r,c1,i,j;
    scanf("%d%d",&r,&c1);
    for(i=0;i<r;i++) for(j=0;j<c1;j++) scanf("%d",&a[i][j]);
    for(i=0;i<r;i++) for(j=0;j<c1;j++) scanf("%d",&b[i][j]);
    for(i=0;i<r;i++) {
        for(j=0;j<c1;j++) {
            c[i][j]=a[i][j]-b[i][j];
            printf("%d ",c[i][j]);
        }
        printf("\n");
    }
    return 0;
}

// Question 17. Write a program to multiply two matrices.
#include <stdio.h>
int main() {
    int a[10][10],b[10][10],c[10][10],i,j,k,r1,c1,r2,c2;
    scanf("%d%d",&r1,&c1);
    for(i=0;i<r1;i++) for(j=0;j<c1;j++) scanf("%d",&a[i][j]);
    scanf("%d%d",&r2,&c2);
    for(i=0;i<r2;i++) for(j=0;j<c2;j++) scanf("%d",&b[i][j]);
    if(c1!=r2) return 0;
    for(i=0;i<r1;i++) for(j=0;j<c2;j++) {
        c[i][j]=0;
        for(k=0;k<c1;k++) c[i][j]+=a[i][k]*b[k][j];
    }
    for(i=0;i<r1;i++) {
        for(j=0;j<c2;j++) printf("%d ",c[i][j]);
```

```
        printf("\n");
    }
    return 0;
}

// Question 18. Write a program to find the transpose of a
matrix.
#include <stdio.h>
int main() {
    int a[10][10],r,c,i,j;
    scanf("%d%d",&r,&c);
    for(i=0;i<r;i++) for(j=0;j<c;j++) scanf("%d",&a[i][j]);
    for(j=0;j<c;j++) {
        for(i=0;i<r;i++) printf("%d ",a[i][j]);
        printf("\n");
    }
    return 0;
}

// Question 19. Write a program to find the sum of diagonal
elements of a matrix.
#include <stdio.h>
int main() {
    int a[10][10],n,i,s=0;
    scanf("%d",&n);
    for(i=0;i<n;i++) for(int j=0;j<n;j++) scanf("%d",&a[i]
[j]);
    for(i=0;i<n;i++) s+=a[i][i]+a[i][n-i-1];
    if(n%2==1) s-=a[n/2][n/2];
    printf("%d",s);
```

```
    return 0;
}
// Question 20. Write a program to check if a matrix is
symmetric
#include <stdio.h>
int main() {
    int a[10][10],n,i,j,f=1;
    scanf("%d",&n);
    for(i=0;i<n;i++) for(j=0;j<n;j++) scanf("%d",&a[i][j]);
    for(i=0;i<n;i++) for(j=0;j<n;j++) if(a[i][j]!=a[j][i])
f=0;
    if(f) printf("yes"); else printf("no");
    return 0;
}

// Question 21. Write a program to check if a matrix is an
identity matrix.
#include <stdio.h>
int main() {
    int a[10][10],n,i,j,f=1;
    scanf("%d",&n);
    for(i=0;i<n;i++) for(j=0;j<n;j++) scanf("%d",&a[i][j]);
    for(i=0;i<n;i++) for(j=0;j<n;j++) {
        if(i==j && a[i][j]!=1) f=0;
        if(i!=j && a[i][j]!=0) f=0;
    }
    if(f) printf("yes"); else printf("no");
    return 0;
}
```

```
// Question 22. Write a program to find the upper triangular
matrix.
#include <stdio.h>
int main() {
    int a[10][10],n,i,j;
    scanf("%d",&n);
    for(i=0;i<n;i++) for(j=0;j<n;j++) scanf("%d",&a[i][j]);
    for(i=0;i<n;i++) {
        for(j=0;j<n;j++) {
            if(i>j) printf("0 ");
            else printf("%d ",a[i][j]);
        }
        printf("\n");
    }
    return 0;
}

// Question 23. Write a program to find the lower triangular
matrix.
#include <stdio.h>
int main() {
    int a[10][10],n,i,j;
    scanf("%d",&n);
    for(i=0;i<n;i++) for(j=0;j<n;j++) scanf("%d",&a[i][j]);
    for(i=0;i<n;i++) {
        for(j=0;j<n;j++) {
            if(i<j) printf("0 ");
            else printf("%d ",a[i][j]);
        }
        printf("\n");
```

```
    }
    return 0;
}

// Question 24. Write a program to count vowels and
consonants in a character array.
#include <stdio.h>
int main() {
    char s[100]; int i,v=0,c=0;
    scanf("%s",s);
    for(i=0;s[i];i++) {
        if((s[i]>='a'&&s[i]<='z')||(s[i]>='A'&&s[i]<='Z')) {
            if(s[i]=='a'||s[i]=='e'||s[i]=='i'||s[i]=='o'||
s[i]=='u'||
               s[i]=='A'||s[i]=='E'||s[i]=='I'||s[i]=='O'||
s[i]=='U') v++;
            else c++;
        }
    }
    printf("%d %d",v,c);
    return 0;
}

// Question 25. Write a program to reverse a string stored in
a character array.
#include <stdio.h>
int main() {
    char s[100];
    int i=0,n;
    scanf("%s",s);
```

```
    while(s[i]) i++;
    n=i;
    for(i=n-1;i>=0;i--) printf("%c",s[i]);
    return 0;
}
// Question 26. Write a program to compare two strings
without using strcmp.
#include <stdio.h>
int main() {
    char a[100],b[100]; int i=0,f=1;
    scanf("%s%s",a,b);
    while(a[i]||b[i]) {
        if(a[i]!=b[i]) { f=0; break; }
        i++;
    }
    if(f) printf("same"); else printf("not same");
    return 0;
}

// Question 27. Write a program to concatenate two strings
without using strcat.
#include <stdio.h>
int main() {
    char a[100],b[100]; int i=0,j=0;
    scanf("%s%s",a,b);
    while(a[i]) i++;
    while(b[j]) { a[i]=b[j]; i++; j++; }
    a[i]='\0';
    printf("%s",a);
    return 0;
```

```
}

// Question 28. Write a program to check if a string is a
palindrome.
#include <stdio.h>
int main() {
    char s[100]; int i=0,j,f=1;
    scanf("%s",s);
    while(s[i]) i++;
    j=i-1;
    for(i=0;i<j;i++,j--) if(s[i]!=s[j]) f=0;
    if(f) printf("yes"); else printf("no");
    return 0;
}

// Question 29. Write a program to convert lowercase letters
to uppercase in a string.
#include <stdio.h>
int main() {
    char s[100]; int i;
    scanf("%s",s);
    for(i=0;s[i];i++) {
        if(s[i]>='a'&&s[i]<='z') s[i]-=32;
    }
    printf("%s",s);
    return 0;
}

// Question 30. Write a program to count words in a string.
#include <stdio.h>
```

```
int main() {
    char s[200]; int i,w=0;
    fgets(s,200,stdin);
    for(i=0;s[i];i++) {
        if((s[i]!=' '&&s[i]!='\n')&&(s[i+1]==' '||
s[i+1]=='\n'||s[i+1]=='\0')) w++;
    }
    printf("%d",w);
    return 0;
}

// Question 31. Write a program to remove all whitespaces
from a string.
#include <stdio.h>
int main() {
    char s[200]; int i=0,j=0;
    fgets(s,200,stdin);
    while(s[i]) {
        if(s[i]!=' '&&s[i]!='\n') s[j++]=s[i];
        i++;
    }
    s[j]='\0';
    printf("%s",s);
    return 0;
}

// Question 32. Employee structure and date validation
#include <stdio.h>

struct emp {
```

```
    char name[50];
    int id;
    float pay;
};

struct date {
    int d, m, y;
};

int main() {
    struct emp e[5];
    int i,m=0;
    for(i=0;i<5;i++) {
        scanf("%s%d%f",e[i].name,&e[i].id,&e[i].pay);
    }
    for(i=1;i<5;i++) {
        if(e[i].pay > e[m].pay) m=i;
    }
    printf("%s\n",e[m].name);

    struct date dt;
    scanf("%d%d%d",&dt.d,&dt.m,&dt.y);
    if(dt.d>=1 && dt.m>=1 && dt.m<=12) {
        int maxd=31;
        if(dt.m==2) {
            if((dt.y%4==0&&dt.y%100!=0)||dt.y%400==0)
maxd=29;
            else maxd=28;
        }
        else if(dt.m==4||dt.m==6||dt.m==9||dt.m==11) maxd=30;
```

```
        if(dt.d<=maxd) printf("valid\n");
        else printf("invalid\n");
    } else printf("invalid\n");
    return 0;
}

// Question 33. Student structure and binary file operations

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

struct stu {
    int r;
    char n[50];
    float m;
};

int main() {
    FILE *f;
    struct stu s;
    int ch,x,found=0;
    char c;
    f=fopen("students.dat","wb");
    scanf("%d",&x);
    for(int i=0;i<x;i++) {
        scanf("%d%s%f",&s.r,s.n,&s.m);
        fwrite(&s,sizeof(s),1,f);
    }
    fclose(f);
```

```
    f=fopen("students.dat","rb");
    while(fread(&s,sizeof(s),1,f)) printf("%d %s
%.2f\n",s.r,s.n,s.m);
    fclose(f);

    scanf("%d",&x);
    f=fopen("students.dat","rb");
    while(fread(&s,sizeof(s),1,f)) {
        if(s.r==x) {
            printf("%d %s %.2f\n",s.r,s.n,s.m);
            found=1;
            break;
        }
    }
    if(!found) printf("not found\n");
    fclose(f);

    f=fopen("students.dat","r+b");
    while(fread(&s,sizeof(s),1,f)) {
        if(s.r==x) {
            scanf("%f",&s.m);
            fseek(f,-sizeof(s),1);
            fwrite(&s,sizeof(s),1,f);
            break;
        }
    }
    fclose(f);
    return 0;
}
```

```
// Question 34. Write data into a file
#include <stdio.h>
int main() {
    FILE *f=fopen("a.txt","w");
    char ch;
    while((ch=getchar())!='~') fputc(ch,f);
    fclose(f);
    return 0;
}

// Question 35. Read data from a file
#include <stdio.h>
int main() {
    FILE *f=fopen("a.txt","r");
    char ch;
    while((ch=fgetc(f))!=EOF) putchar(ch);
    fclose(f);
    return 0;
}

// Question 36. Append data into a file
#include <stdio.h>
int main() {
    FILE *f=fopen("a.txt","a");
    char ch;
    while((ch=getchar())!='~') fputc(ch,f);
    fclose(f);
    return 0;
}
```

```
// Question 37. Delete file content (clear contents)
#include <stdio.h>
int main() {
    FILE *f=fopen("a.txt","w");
    fclose(f);
    return 0;
}

// Question 38. Delete a file
#include <stdio.h>
int main() {
    remove("a.txt");
    return 0;
}
```