MCA Lab Assignment - C Solutions (Q1 - Q15)

Note: These are C programs solving Questions 1 to 15 from the uploaded assignment.
Run each program separately. Comments explain usage.

Q1. Biggest number from four integers a, b, c & d.
```c
#include <stdio.h>
int main() {
    int a,b,c,d;
    printf("Enter four integers: ");
    if (scanf("%d %d %d %d",&a,&b,&c,&d)!=4) return 0;
    int max = a;
    if (b>max) max=b;
    if (c>max) max=c;
    if (d>max) max=d;
    printf("Biggest = %d\n", max);
    return 0;
}
```

Q2. Smallest number from four integers a, b, c & d.
```c
#include <stdio.h>
int main() {
    int a,b,c,d;
    printf("Enter four integers: ");
    if (scanf("%d %d %d %d",&a,&b,&c,&d)!=4) return 0;
    int min = a;
    if (b<min) min=b;
    if (c<min) min=c;
    if (d<min) min=d;
    printf("Smallest = %d\n", min);
    return 0;
}
```

Q3. Marks of 3 subjects (max 100 each). Display marks, percentage and grade.
```c
#include <stdio.h>
int main() {
    int m1,m2,m3;
    printf("Enter marks of 3 subjects (0-100): ");
    if (scanf("%d %d %d",&m1,&m2,&m3)!=3) return 0;
    int total = m1+m2+m3;
    float percentage = total / 3.0;
    char grade;
    char gradeStr[4];
    if (percentage >= 80) { strcpy(gradeStr,"O"); }
    else if (percentage >= 70) { strcpy(gradeStr,"A+"); }
    else if (percentage >= 60) { strcpy(gradeStr,"A"); }
    else if (percentage >= 50) { strcpy(gradeStr,"B"); }
    else if (percentage >= 40) { strcpy(gradeStr,"C"); }
    else { strcpy(gradeStr,"F"); }
    printf("Marks Obtained/Max Marks: %d/300\n", total);
    printf("Percentage: %.2f\n", percentage);
    printf("Grade: %s\n", gradeStr);
```

```
    return 0;
}
```

Q4. Sum and average of n random integers given by keyboard.
```c
#include <stdio.h>
int main() {
    int n;
    printf("Enter n: ");
    if (scanf("%d",&n)!=1 || n<=0) { printf("Invalid n\n"); return 0; }
    int sum=0;
    for (int i=0;i<n;i++) {
        int x; printf("Enter integer %d: ", i+1);
        scanf("%d",&x);
        sum += x;
    }
    double avg = sum / (double)n;
    printf("Sum = %d\nAverage = %.2f\n", sum, avg);
    return 0;
}
```

Q5. Factorial of a given integer n.
```c
#include <stdio.h>
unsigned long long fact(int n) {
    unsigned long long f=1;
    for (int i=2;i<=n;i++) f *= i;
    return f;
}
int main() {
    int n;
    printf("Enter n: ");
    if (scanf("%d",&n)!=1 || n<0) { printf("Invalid n\n"); return 0; }
    printf("%d! = %llu\n", n, fact(n));
    return 0;
}
```

Q6. Sum = 1! + 3! + 5! + ... + n! (assuming n is odd; if even, includes up to n-1)
```c
#include <stdio.h>
unsigned long long fact(int n){ unsigned long long f=1; for(int i=2;i<=n;i++) f*=i; return f; }
int main(){
    int n; printf("Enter n (max term): "); if(scanf("%d",&n)!=1) return 0;
    unsigned long long sum=0;
    for(int i=1;i<=n;i+=2) sum += fact(i);
    printf("Sum = %llu\n", sum);
    return 0;
}
```

Q7. Sum = 2! + 4! + 6! + ... + n! (assuming n is even; else up to n-1)
```c
#include <stdio.h>
unsigned long long fact(int n){ unsigned long long f=1; for(int i=2;i<=n;i++) f*=i; return f; }
int main(){
```

```c
    int n; printf("Enter n (max term): "); if(scanf("%d",&n)!=1) return 0;
    unsigned long long sum=0;
    for(int i=2;i<=n;i+=2) sum += fact(i);
    printf("Sum = %llu\n", sum);
    return 0;
}
```

Q8. Sum = x + x^2/2! + x^3/3! + ... + x^n/n!
```c
#include <stdio.h>
#include <math.h>
unsigned long long fact(int n){ unsigned long long f=1; for(int i=2;i<=n;i++) f*=i; return f; }
int main(){
    int n; double x;
    printf("Enter x and n: ");
    if(scanf("%lf %d",&x,&n)!=2) return 0;
    double sum = 0.0;
    for(int i=1;i<=n;i++){
        sum += pow(x,i) / (double)fact(i);
    }
    printf("Sum = %.6f\n", sum);
    return 0;
}
```

Q9. Sum = x + x^3/3! + x^5/5! + ... + x^n/n! (odd powers)
```c
#include <stdio.h>
#include <math.h>
unsigned long long fact(int n){ unsigned long long f=1; for(int i=2;i<=n;i++) f*=i; return f; }
int main(){
    int n; double x;
    printf("Enter x and max n (odd max): ");
    if(scanf("%lf %d",&x,&n)!=2) return 0;
    double sum=0.0;
    for(int i=1;i<=n;i+=2) sum += pow(x,i) / (double)fact(i);
    printf("Sum = %.6f\n", sum);
    return 0;
}
```

Q10. Display 10x10 multiplication table (1..10).
```c
#include <stdio.h>
int main(){
    for(int i=1;i<=10;i++){
        for(int j=1;j<=10;j++){
            printf("%4d", i*j);
        }
        printf("\n");
    }
    return 0;
}
```

Q11. Pattern:
5

5 4
5 4 3
5 4 3 2
5 4 3 2 1
```c
#include <stdio.h>
int main(){
    for(int i=1;i<=5;i++){
        for(int j=0;j<i;j++){
            printf("%d\t", 5-j);
        }
        printf("\n");
    }
    return 0;
}
```

Q12. Pattern:
5
4 5
3 4 5
2 3 4 5
1 2 3 4 5
```c
#include <stdio.h>
int main(){
    for(int i=5;i>=1;i--){
        for(int j=i;j<=5;j++){
            printf("%d\t", j);
        }
        printf("\n");
    }
    return 0;
}
```

Q13. Right-aligned triangular pattern ending with 1 2 3 4 5 (as given).
```c
#include <stdio.h>
int main(){
    int n=5;
    for(int i=1;i<=n;i++){
        for(int s=0;s< (n-i)*4; s++) putchar(' ');
        int val = n;
        for(int j=1;j<=i;j++){
            printf("%d\t", val--);
        }
        printf("\n");
    }
    return 0;
}
```

Q14. Mirror of Q13 where rows start from decreasing start to 1..5
```c
#include <stdio.h>
int main(){
    int n=5;
```

```
    for(int i=n;i>=1;i--){
        for(int s=0;s< (i-1)*4; s++) putchar(' ');
        for(int j=i;j<=n;j++){
            printf("%d\t", j);
        }
        printf("\n");
    }
    return 0;
}
```

Q15. Pyramid mirrored numbers:

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

```c
#include <stdio.h>
int main(){
    int n=5;
    for(int i=1;i<=n;i++){
        for(int s=0;s<(n-i)*4;s++) putchar(' ');
        for(int j=0;j<i;j++) printf("%d\t", n-j);
        for(int j=2;j<=i;j++) printf("%d\t", n-(i-j));
        printf("\n");
    }
    return 0;
}
```

End of Q1-Q15 solutions.