3. Define data structures. Give some examples.
4. In how many ways can you categorize data structures? Explain each of them.
5. Discuss the applications of data structures.
6. Write a short note on different operations that can be performed on data structures.
7. Compare a linked list with an array.
8. Write a short note on abstract data type.
9. Explain the different types of data structures. Also discuss their merits and demerits.
10. Define an algorithm. Explain its features with the help of suitable examples.
11. Explain and compare the approaches for designing an algorithm.
12. What is modularization? Give its advantages.
13. Write a brief note on trees as a data structure.
14. What do you understand by a graph?
15. Explain the criteria that you will keep in mind while choosing an appropriate algorithm to solve a particular problem.
16. What do you understand by time–space trade-off?
17. What do you understand by the efficiency of an algorithm?
18. How will you express the time complexity of a given algorithm?
19. Discuss the significance and limitations of the Big O notation.
20. Discuss the best case, worst case, average case, and amortized time complexity of an algorithm.
21. Categorize algorithms based on their running time complexity.
22. Give examples of functions that are in Big O notation as well as functions that are not in Big O notation.
23. Explain the little o notation.
24. Give examples of functions that are in little o notation as well as functions that are not in little o notation.
25. Differentiate between Big O and little o notations.
26. Explain the Ω notation.
27. Give examples of functions that are in Ω notation as well as functions that are not in Ω notation.
28. Explain the Θ notation.
29. Give examples of functions that are in Θ notation as well as functions that are not in Θ notation.

Time Complexity Problems

1. In each of the below mentioned scenario, deduce the general formula f(n) where n is the input size for a given instance of the problem:

a.
```
for(i=0;i<100;i+=2)
        statement block;
```
b.
```
for(i=1000;i>0;i/=2)
        statement block;
```
c.
```
for(i=0;i<10;i++)
        for(j=1; j<10;j*=2)
                statement block;
```
d.
```
for(i=0;i<10;i++)
        for(j=0; j<10;j++)
                statement block;
```
e.
```
for(i=0;i<10;i++)
        for(j=0; j<=i; j++)
                statement block;
```

2. What is a polynomial function and an exponential function? Provide examples in each of the functions.

3. Let $f(n)=2^n$ and $g(n)=n^{2.}$ Compare the values of f(n) and g(n) for n=1 to n, and provide the conclusion on the rate of increase among them.