

IT 5402 Design and Analysis of Algorithms

Fourth Semester

Assignment weightage for First test : 40 %

For remaining 60% Test would be conducted

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ASSIGNMENT – 1

Write and Practice the art of algorithm writing for the given problems.

1. Swap two numbers
2. Check whether a number is prime or not.
3. Find GCD of a number
4. Convert an integer to a binary number.
5. Check whether a word is a palindrome or not.

Find the run time of these algorithms. Write these algorithms and use step count and operations count approach.

7. Swap two numbers
8. Check whether a number is prime or not.
9. Convert an integer to a binary number.

10. Show that

$$6n^2 + 16n \in O(n^2)$$

$$6n^2 + 16n \notin O(n^2)$$

11. Use appropriate notation for

$$\sum_{i=1}^n i$$

$$\sum_{i=1}^n 6i^2 + 6$$

12. Use substitution and Guess and verify approach to solve these recurrent equations

a.  $t_n = t_{n-1} + 3$

b.  $t_n = 2t_{n-1} + 1$

$$c. t_n = 2t_{n-1} + n^2$$

13. Use Polynomial reduction and solve these problems.

$$a. t_n = 3t_{n-1} + 4t_{n-2}$$

$$b. t_n = 7t_{n-1} - 12t_{n-2}$$

14. Use Master theorem and solve these problems.

$$T(n) = 3T(n/2) + n, T(0) = 0.$$

$$T(n) = T\left(\frac{n}{2}\right) + (n - 1)$$

$$T(n) = 2T(n/2) + n^2$$

$$T(n) = 7T(n/2) + 1, T(0) = 0$$

$$T(n) = 4T\left(\frac{n}{3}\right) + 1$$

$$T(n) = T\left(\frac{n}{2}\right) + n$$

$$T(n) = 7T\left(\frac{n}{2}\right) + 18\left(\frac{n}{2}\right)^2$$

$$T(n) = 3T(n/3) + n$$

15. Use Recurrence Tree method and solve these equations.

$$T(n) = T\left(\frac{n}{2}\right) + 1; \text{ compare it with the tree of } T(n)$$

$$T\left(\frac{n}{2}\right) + n$$

$$T(n) = 4T\left(\frac{n}{3}\right) + n^2$$

$$T(n) = 3T\left(\frac{n}{2}\right) + n$$