

600.363/463 Algorithms
Assignment 1
Due Sept 16, 2013

I. Given 2 arrays A and B , each of size n ,

1. Design an algorithm to test whether there is at least one common element between the 2 arrays,
2. Prove its correctness, and
3. Estimate its speed.

II. Solve the following recurrence by successive substitutions.

$$f(1) = 1, \text{ and}$$

$$f(n) = 2f(n-1) + n, \text{ for any } n > 1.$$

III. Which of the following equalities are true and why?

1. $3n^2 + 6n = O(n^2)$

2. $3n^2 + 6n = O(n^2 \log n)$

3. $n^2 \log n = O(n^2)$

4. $3^n = O(2^n)$

5. $\log n = O((\log \log n)^4)$

6. $n = O((\log n)^{\log n})$

7. $n^{100} = O(2^n)$