

Show the following are correct:

1.) $5n^2 - 6n = \Theta(n^2)$

2.) $n! = O(n^n)$

3.) $33n^3 + 4n^2 = \Omega(n^2)$

4.) $n^3 + 10^6n^2 = \Theta(n^3)$

5.) $\frac{6n^3}{\log_2 n + 1} = O(n^3)$

6.) $33n^3 + 4n^2 = \Omega(n^3)$

7.) Prove the correctness of the following algorithm:

```

    procedure sort(A[1...n])      // n > 0
1      for i := n to 1
2          for j := 1 to i - 1
3              if A[j] > A[j+1]
4                  temp := A[j]
5                  A[j] := A[j+1]
6                  A[j+1] := temp
    end procedure

```

8.) Show the worst case (Big O) performance of the algorithm in Exercise #7.

9.) Show the average case (Big Θ) performance of the algorithm in Exercise #7.

10.) Show the worst case (Big O) and average case (Big Θ) performance of the following algorithm:

```

    procedure find(T[0...n-1], P[0...m-1])  // 1 ≤ m ≤ n
1      for i := 0 to n - m
2          j := 0
3          while j < m and P[j] = T[i+j]
4              j := j + 1
5          if j = m
6              return i
7      return -1
    end procedure

```

▷ The *find* algorithm returns the index of the pattern “P” in the text “T” if the pattern occurs in the text. If the pattern is not in the text then the *find* algorithm returns -1 . Note, the array indexes start at zero.

Due date:

Friday 09/04 at the start of class.

How to submit:

Submit a printed copy of your responses at the start of class on the due date.

Use the L^AT_EX template from the class web page to write up your responses.

If you need help with L^AT_EX, drop by the office.