HW1 EE599

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Question 1

Assume result is not the maximum value, then there are must be a x in the input vectors that x > result.

Then according to the algorithm, if x > result, then set the value of result as x.

Then, result = x, which is contradictory to result < x.

Therefore, we can prove that the FindMax function always finds the maximum value in the input vector for non empty input vectors.

Question 2

https://github.com/njuxty

https://stackoverflow.com/users/12741198/njuxty

Question 3

The code has been checked into my github.

The runtime is O(N).

Question 4

a. -f delete the file without confirmation

-r delete the folder and files in it without confirmation

Question 5

1. Example1

f(n) = n + n/2 + n/4 + … + 1 = n(1 + ½ + ¼ + …) = n * (1 – 1/2n) / ½ = 2n - 1

Thus the time complexity is O(N).

2. Example2

Assume the times the loop runs as c, then n = 2^c.

Thus the time complexity is O(logN).

Question 6

1. The result is -1 when n < 0.

4. The runtime of the recursive version is O(N).

   The runtime of the non-recursive version is O(N).

5. When N = 0, N! = 1, the algorithm is true.

   When N = 1, N! = 1, the algorithm is true.

   Assume when N = k, the algorithm is true and the result is k!.

   Then when N = k + 1, according to the algorithm, result = (k + 1) * result = (k + 1) * k! = (k + 1)! = N!.

   So we can prove the algorithm is true.