COM Design and Analysis of Algorithms `Assignment-1`

Note: All assignments involve a team of size 5 or 6. Due: 18/Jan

1. Given an integer array, write an algorithm to find max and min. Calculate its step count. Express the step count (time complexity) interms of O, Ω, θ, o, ω.
2. Write a recursive algorithm to search an element in an integer array. Calculate its step count. Express the step count (time complexity) interms of O, Ω, θ, o, ω.
3. Algorithm A performs 10 n^2 basic operations, and algorithm B performs 300 $\log n$ basic operations. For what value of n does algorithm B start to show its better performance.
4. In each of the following situations, indicate whether $f = O(g)$ or $f = \Omega(g)$ or both (in which case $f = \theta(g)$

	$f(n)$	$g(n)$
(a)	n-100	n-200
(b)	100n + log n	n + $(logn)^2$
(c)	log 2n	log 3n
(d)	$n^{1.01}$	$nlog^2n$
(e)	$n2^n$	3^n
(f)	$n!$	2^n

5. Arrange the following functions in order. 7, $\frac{1}{n^2}$, $2^{n.\log n}$, $4^{\log n}$, $n^{\log 7}$, $n!$, $(\frac{n}{e})^n$
6. For each of the above function, express the function (time complexity) using little-oh and little-omega.
7. Fill-in the following table with a tick if the asymptotic notation satisfies the property. Justify any three.

Notation	Reflectivity	Symmetric	Transitive	Antisymmetric
θ				
O				
Ω				
o				
ω				