$f = \Theta(g)$	f grows at the same rate as g	There exists an n_0 and constants $c_1,c_2>0$ such that for all $n>n_0,c_1g(n)\leq f(n) \leq c_2g(n).$	Data structure	Access	Insert	Delete	Search	Traverse	
			Linear						
f = O(g)	\boldsymbol{f} grows no faster than \boldsymbol{g}	There exists an n_0 and a constant $c>0$ such that for all $n>n_0$, $ f(n) \leq cg(n)$.	Array	O(1)	O(1)	O(n)	O(n)	O(n)	
			Ordered array	O(1)	O(n)	O(n)	O(logn)	O(n)	
$f = \Omega(g)$	\boldsymbol{f} grows at least as fast as \boldsymbol{g}	There exists an n_0 and a constant $c > 0$ such that	Linked list	O(n)	O(1)	O(n)	O(n)	O(n)	
		for all $n > n_0$, $cg(n) \le f(n) $.	Matrix	O(1)	O(1)	O(1)	O(m*n)	O(m*n)	
f = o(g)	f grows slower than g	For all $c > 0$, there exists an n_0 such that for all	Stack	O(1)	O(1)	O(1)	O(n)	O(n)	
1		$n > n_0$, $ f(n) \le cg(n)$.	Queue	O(1)	O(1)	O(1)	O(n)	O(n)	
$f=\omega(g)$	f grows faster than g	For all $c > 0$, there exists an n_0 such that for all $n > n_0$, $cg(n) \le f(n) $.	Sort	Best	Avg	Worst	Space	Stable	
			Bubble sort	O(n)	O(n^2)	O(n^2)	O(1)	Yes	
$f \sim g$	f/g approaches 1	$\lim_{n\to\infty} f(n)/g(n) = 1$	Selection sort	O(n^2)	O(n^2)	O(n^2)	O(1)	No	
(a) Insert 9, 0, 8	Testistanus 1		Insertion sort	O(n)	O(n^2)	O(n^2)	O(1)	Yes	
	089		Merge sort	O(n*logn)	O(n*logn)	O(n*logn)	O(n)	Yes	
(b) Insert 1			Quick sort	O(n*logn)	O(n*logn)	O(n^2)	O(logn)	No	
(c) Insert 7	2 100 17 9								
(d) Insert 2	is RED some as "parent is							with	
(e) Insert 6	267 9	left child no interchanged							
(f) Insert 3	2 7 9	0 23 7 9	uncle is RED ? yes (C	no Case 1)	X is a ves		ne		

Color parent black Color uncle black

Color grandparent red

X = Grandparent(X)

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(g) Insert 5

(h) Insert 4

X is a yes (Case 2)

no (Case 3)

Color grandparent red

Rotate-left on parent

Rotate-right on grandparent

Done

Color X black

right child

Color parent black

Color grandparent red

Rotate-right on grandparent

Done