1. Algorithms

Name	Worst	Average	Hidden constants	In place
Insertion sort	$\Theta(n^2)$	$\Theta(n^2)$	small	yes
Merge sort	$\Theta(n * logn)$	$\Theta(n * logn)$	large	no
Heap sort	$O(n * logn)$	-	small	yes
Quicksort	$\Theta(n^2)$	$\Theta(n * logn)$ expected	small	yes
Counting sort	$\Theta(k + n)$	$\Theta(k + n)$	large	no
Radix sort	$\Theta(d * (k + n))$	$\Theta(d * (k + n))$	large	no
Bucket sort	$\Theta(n^2)$	$\Theta(n)$	large	no

Key: k - constant, d - constant

2. Sum

Name	Formula
Arithmetic	$\sum_{k=1}^{n} k = \frac{n(n+1)}{2}$
Arithmetic	$\sum_{k=0}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$
Arithmetic	$\sum_{k=0}^{n} k^3 = \frac{n^2(n+1)^2}{4}$
Geometric	$\sum_{k=0}^{n} x^k = \frac{x^{n+1}-1}{x-1}$
Geometric	$\sum_{k=0}^{\infty} x^k = \frac{1}{1-x}$, where x < 1
Harmonic	$\sum_{k=1}^{n} 1/k = ln(n)$
Integrating	$\sum_{k=0}^{\infty} kx^k = \frac{x}{(1-x)^2}$, where x < 1

3. Logs

Exp		Equiv
$\log(\prod_{k=1}^{n} a_k)$	=	$\sum_{k=1}^{n} log(a_k)$
$\log_b a$	=	$\frac{\log_c a}{\log_c b}$