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) $

Name	Formula
Integrating	$\sum_{k=0}^{\infty} kx^k = \frac{x}{(1-x)^2}$, where x < 1

3. Logs

Exp		Equiv
$\log(\prod_{k=1}^{n} a\_k)$	=	$\sum_{k=1}^{n} log(a\_k)$
$\log\_b a$	=	$\frac{\log\_c a}{\log\_c b}$

4. Finance

- Black Scholes

$$C(S_t, t) = N(d_1) * S_t - N(d_2) * Ke^{-r(T-t)}$$

$$d_1 = \frac{1}{\sigma(T-t)^{1/2}}[\ln(\frac{S_t}{K}) + (r + \frac{\sigma^2}{2} * (T-t))]$$

$$d_2 = d_1 - \sigma(T-t)^{1/2}$$

$$N(\cdot) =$$

the cumulative distribution function of the standard normal distribution

$$S_t$$

the spot price of the underlying asset

$$K$$

the strike price

$$r$$

the risk free rate (annual rate, expressed in terms of continuous compounding)

$$\sigma$$

the volatility of returns of the underlying asset

- TBU