Appendices

Integral Table

$\int \frac{1}{1+x^2}dx = \tan^{-1}x \quad \int \frac{1}{a^2+x^2}dx = \frac{1}{a}\tan^{-1}\frac{x}{a}$

$\int \frac{x}{a^2+x^2}dx = \frac{1}{2}\ln|a^2+x^2| \quad \int \frac{x^2}{a^2+x^2}dx = x - a\tan^{-1}\frac{x}{a}$

$\int \sqrt{x^2 \pm a^2}dx = \frac{1}{2}x\sqrt{x^2 \pm a^2} \pm \frac{1}{2}a^2 \ln\left|x + \sqrt{x^2 \pm a^2}\right|$

$\int \sqrt{a^2 - x^2}dx = \frac{1}{2}x\sqrt{a^2 - x^2} + \frac{1}{2}a^2\tan^{-1}\frac{x}{\sqrt{a^2-x^2}}$

$\int \frac{x^2}{\sqrt{x^2 \pm a^2}}dx = \frac{1}{2}x\sqrt{x^2 \pm a^2} \mp \frac{1}{2}a^2 \ln\left|x + \sqrt{x^2 \pm a^2}\right|$

$\int \frac{1}{\sqrt{x^2 \pm a^2}}dx = \ln\left|x + \sqrt{x^2 \pm a^2}\right|$

$\int \frac{1}{\sqrt{a^2 - x^2}}dx = \sin^{-1}\frac{x}{a} \quad \int \frac{x}{\sqrt{x^2 \pm a^2}}dx = \sqrt{x^2 \pm a^2} \quad \int \frac{x}{\sqrt{a^2-x^2}}dx = -\sqrt{a^2 - x^2}$

$\int \sqrt{ax^2 + bx + c}dx = \frac{b+2ax}{4a}\sqrt{ax^2 + bx + c} + \frac{4ac-b^2}{8a^{3/2}} \ln\left|2ax + b + 2\sqrt{a(ax^2 + bx + c)}\right|$

$\int x^n e^{ax}\,\mathrm{d}x = \frac{x^n e^{ax}}{a} - \frac{n}{a}\int x^{n-1}e^{ax}\,\mathrm{d}x$

$\int \sin^2 axdx = \frac{x}{2} - \frac{1}{4a}\sin 2ax \quad \int \sin^3 axdx = -\frac{3\cos ax}{4a} + \frac{\cos 3ax}{12a}$

$\int \cos^2 axdx = \frac{x}{2} + \frac{\sin 2ax}{4a} \quad \int \cos^3 axdx = \frac{3\sin ax}{4a} + \frac{\sin 3ax}{12a}$

$\int \tan axdx = -\frac{1}{a}\ln\cos ax \quad \int \tan^2 axdx = -x + \frac{1}{a}\tan ax$

$\int x\cos axdx = \frac{1}{a^2}\cos ax + \frac{x}{a}\sin ax \quad \int x^2\cos axdx = \frac{2x\cos ax}{a^2} + \frac{a^2x^2-2}{a^3}\sin ax$

$\int x\sin axdx = -\frac{x\cos ax}{a} + \frac{\sin ax}{a^2} \quad \int x^2\sin axdx = \frac{2-a^2x^2}{a^3}\cos ax + \frac{2x\sin ax}{a^2}$

Triangle Equations

$\sin(a \pm b) = \sin a\cos b \pm \cos a\sin b \quad \cos(a \pm b) = \cos a\cos b \mp \sin a\sin b$

$\tan(a \pm b) = \frac{\tan(a)\pm\tan(b)}{1\mp\tan(a)\tan(b)} \quad \tan(a) \pm \tan(b) = \frac{\sin(a\pm b)}{\cos(a)\cos(b)}$

$\sin(a) + \sin(b) = 2\sin(\frac{a+b}{2})\cos(\frac{a-b}{2}) \quad \sin(a) - \sin(b) = 2\cos(\frac{a+b}{2})\sin(\frac{a-b}{2})$

$\cos(a) + \cos(b) = 2\cos(\frac{a+b}{2})\cos(\frac{a-b}{2}) \quad \cos(a) - \cos(b) = -2\sin(\frac{a+b}{2})\sin(\frac{a-b}{2})$

$\sin(na) = n\cos^{n-1}a\sin a - \binom{n}{3}\cos^{n-3}a\sin^3 a + \binom{n}{5}\cos^{n-5}a\sin^5 a - \ldots$

$\cos(na) = \cos^n a - \binom{n}{2}\cos^{n-2}a\sin^2 a + \binom{n}{4}\cos^{n-4}a\sin^4 a - \ldots$

Chordal Graph

1. Clique Number $\leq$ Color Number , They are equal in Chordal Graph.
2. Let $next(v)$ be the earliest point in $N(v)$. To check whether $v \cup N(v)$ is a maximal clique, we only have to check whether there exists an w with $Next(w) = v$ and $|N(v)| + 1 \leq |N(w)|$.
3. Minimum Color : Following Perfect Elimination Sequence, from back to front to color each node with the smallest possible color.
4. Maximum Independent Set : Following Perfect Elimination Sequence, from front to back, choose if you can.
5. Maximum Independent Set = Minimum Clique Cover , Minimum Clique Cover : If the Maximum Independent Set is $\{p_1, p_2, \ldots, p_t\}$, Then $\{p_1 \cup N(p_1), \ldots, p_t \cup N(p_t)\}$ is the Minimum Clique Cover.

Maximum Cardinality Search

- Follow the order from n to 1 to label all the vertices, (the vertex with label i is the i-th vertex in the perfect elimination sequence).
- Let L_i denote that how many neighbors of i are labeled vertices, each time we choose an unlabeled vertex with largest L_i.

Constant Table

n	$\log_{10} n$	$n!$	$nC(n/2)$	LCM$(1,\ldots,n)$	P_n	B_n
2	0.30	2	2	2	2	2
3	0.48	6	3	6	3	5
4	0.60	24	6	12	5	15
5	0.70	120	10	60	7	52
6	0.78	720	20	60	11	203
7	0.85	5040	35	420	15	877
8	0.90	40320	70	840	22	4140
9	0.95	362880	126	2520	30	21147
10	1	3628800	252	2520	42	115975
11		39916800	462	27720	56	678570
12		479001600	924	27720	77	4213597
15			6435	360360	176	1382958545
20			184756	232792560	627	
25			5200300		1958	
30			155117520		5604	
40					37338	
50					204226	
70					4087968	
100					190569292	