A Short Table of Indefinite Integrals, *Hughes-Hallett et al.*

I.1. $\displaystyle\int x^n\,dx = \frac{1}{n+1}x^{n+1} + C,\ n \neq -1$

2. $\displaystyle\int \frac{1}{x}\,dx = \ln|x| + C$

3. $\displaystyle\int a^x\,dx = \frac{1}{\ln a}a^x + C$

4. $\displaystyle\int \ln x\,dx = x\ln x - x + C,\ x > 0$

5. $\displaystyle\int \sin x\,dx = -\cos x + C$

6. $\displaystyle\int \cos x\,dx = \sin x + C$

7. $\displaystyle\int \tan x\,dx = -\ln|\cos x| + C$

II.8. $\displaystyle\int e^{ax}\sin(bx)\,dx = \frac{1}{a^2+b^2}e^{ax}\left[a\sin(bx) - b\cos(bx)\right] + C$

9. $\displaystyle\int e^{ax}\cos(bx)\,dx = \frac{1}{a^2+b^2}e^{ax}\left[a\cos(bx) + b\sin(bx)\right] + C$

10. $\displaystyle\int \sin(ax)\sin(bx)\,dx = \frac{1}{b^2-a^2}\left[a\cos(ax)\sin(bx) - b\sin(ax)\cos(bx)\right] + C,\ a \neq b$

11. $\displaystyle\int \cos(ax)\cos(bx)\,dx = \frac{1}{b^2-a^2}\left[b\cos(ax)\sin(bx) - a\sin(ax)\cos(bx)\right] + C,\ a \neq b$

12. $\displaystyle\int \sin(ax)\cos(bx)\,dx = \frac{1}{b^2-a^2}\left[b\sin(ax)\sin(bx) + a\cos(ax)\cos(bx)\right] + C,\ a \neq b$

III.13. $\displaystyle\int x^n\ln x\,dx = \frac{1}{n+1}x^{n+1}\ln x - \frac{1}{(n+1)^2}x^{n+1} + C,\ n \neq -1,\ x > 0$

14. $\displaystyle\int p(x)e^{ax}\,dx = \frac{1}{a}p(x)e^{ax} - \frac{1}{a}\int p'(x)e^{ax}\,dx + C$

15. $\displaystyle\int p(x)\sin ax\,dx = -\frac{1}{a}p(x)\cos ax + \frac{1}{a}\int p'(x)\cos ax\,dx + C$

16. $\displaystyle\int p(x)\cos ax\,dx = \frac{1}{a}p(x)\sin ax - \frac{1}{a}\int p'(x)\sin ax\,dx + C$

IV.17. $\displaystyle\int \sin^n x\,dx = -\frac{1}{n}\sin^{n-1}x\cos x + \frac{n-1}{n}\int \sin^{n-2}x\,dx + C,\ n$ positive

18. $\displaystyle\int \cos^n x\,dx = \frac{1}{n}\cos^{n-1}x\sin x + \frac{n-1}{n}\int \cos^{n-2}x\,dx + C,\ n$ positive

19. $\displaystyle\int \frac{1}{\sin^m x}\,dx = \frac{-1}{m-1}\frac{\cos x}{\sin^{m-1}x} + \frac{m-2}{m-1}\int \frac{1}{\sin^{m-2}x}\,dx + C,\ m \neq 1,\ m$ positive

20. $\displaystyle\int \frac{1}{\sin x}\,dx = \frac{1}{2}\ln\left|\frac{(\cos x)-1}{(\cos x)+1}\right| + C$

21. $\displaystyle\int \frac{1}{\cos^m x}\,dx = \frac{1}{m-1}\frac{\sin x}{\cos^{m-1}x} + \frac{m-2}{m-1}\int \frac{1}{\cos^{m-2}x}\,dx + C,\ m \neq 1,\ m$ positive

22. $\displaystyle\int \frac{1}{\cos x}\,dx = \frac{1}{2}\ln\left|\frac{(\sin x)+1}{(\sin x)-1}\right| + C$

23. $\displaystyle\int \sin^m x\,\cos^n x\,dx$: (See the explanation in the text)

V.24. $\displaystyle\int \frac{1}{x^2+a^2}\,dx = \frac{1}{a}\arctan\frac{x}{a} + C,\ a \neq 0$

25. $\displaystyle\int \frac{bx+c}{x^2+a^2}\,dx = \frac{b}{2}\ln\left|x^2+a^2\right| + \frac{c}{a}\arctan\frac{x}{a} + C,\ a \neq 0$

26. $\displaystyle\int \frac{1}{(x-a)(x-b)}\,dx = \frac{1}{a-b}\left(\ln|x-a| - \ln|x-b|\right) + C,\ a \neq b$

27. $\displaystyle\int \frac{cx+d}{(x-a)(x-b)}\,dx = \frac{1}{a-b}\left((ac+d)\ln|x-a| - (bc+d)\ln|x-b|\right) + C,\ a \neq b$

VI.28. $\displaystyle\int \frac{1}{\sqrt{a^2-x^2}}\,dx = \arcsin\frac{x}{a} + C$

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

30. $\displaystyle\int \sqrt{a^2\pm x^2}\,dx = \frac{1}{2}\left(x\sqrt{a^2\pm x^2} + a^2\int \frac{1}{\sqrt{a^2\pm x^2}}\,dx\right) + C$

31. $\displaystyle\int \sqrt{x^2-a^2}\,dx = \frac{1}{2}\left(x\sqrt{x^2-a^2} - a^2\int \frac{1}{\sqrt{x^2-a^2}}\,dx\right) + C$