INTEGRATION

1. $\int x^n dx = \frac{x^{n+1}}{n+1} + C$
2. $\int \frac{1}{x} dx = \log x + C$
3. $\int e^x dx = e^x + C$
4. $\int a^x dx = \frac{a^x}{\log a} + C$
5. $\int \sin x dx = -\cos x + C$
6. $\int \cos x dx = \sin x + C$
7. $\int \sec^2 x dx = \tan x + C$
8. $\int \operatorname{cosec}^2 x dx = -\cot x + C$
9. $\int \sec x \tan x dx = \sec x + C$
10. $\int \operatorname{csc} x \cot x dx = -\operatorname{csc} x + C$
11. $\int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1} x$
12. $\int \frac{1}{1+x^2} dx = \tan^{-1} x$
13. $\int \frac{1}{x\sqrt{x^2-1}} dx = \sec^{-1} x$
14. $\int \sinh x dx = \cosh x + C$
15. $\int \cosh x dx = \sinh x + C$
16. $\int \operatorname{sech}^2 x dx = \tanh x + C$
17. $\int \operatorname{cosech}^2 x dx = -\coth x + C$
18. $\int \operatorname{sech} x \tanh x dx = -\operatorname{sech} x + C$
19. $\int \operatorname{csch} x \coth x dx = -\operatorname{csch} x + C$
20. $\int \frac{1}{x\sqrt{x^2-1}} dx = \sec^{-1} x$ or $-\operatorname{csch}^{-1} x$
21. $\int \frac{1}{\sqrt{1+x^2}} dx = \sinh^{-1} x + C$
22. $\int \frac{1}{\sqrt{x^2-1}} dx = \cosh^{-1} x + C$
23. $\int \tan x dx = \log(\sec x) + C$
24. $\int \cot x dx = \log(\sin x) + C$
25. $\int \sec x dx = \log(\sec x + \tan x) + C$
26. $\int \operatorname{csc} x dx = \log(\operatorname{cosec} x - \cot x) + C$ or $\log(\tan \frac{\pi}{2})$
27. $\int \frac{f'(x)}{f(x)} dx = \log f(x) + C$
28. $\int (f(x))^n f'(x) dx = \frac{f(x)^{n+1}}{n+1} + C$
29. $\int e^x [f(x) + f'(x)] dx = e^x f(x) + C$
30. $\int \frac{1}{\sqrt{a^2-x^2}} dx = \frac{1}{a} \sin^{-1}\left(\frac{x}{a}\right) + C$
31. $\int \frac{1}{\sqrt{a^2+x^2}} dx = \frac{1}{a} \sinh^{-1}\left(\frac{x}{a}\right) + C$
32. $\int \frac{1}{\sqrt{x^2-a^2}} dx = \cosh^{-1}\left(\frac{x}{a}\right) + C$
33. $\int \frac{1}{a^2+x^2} dx = \frac{1}{a} \tan^{-1}\left(\frac{x}{a}\right) + C$
34. $\int \frac{1}{a^2-x^2} dx = \frac{1}{2a} \log\left|\frac{a+x}{a-x}\right| + C$
35. $\int \frac{1}{x^2-a^2} dx = \frac{1}{2a} \log\left|\frac{x-a}{x+a}\right| + C$
37. $\int \sqrt{a^2-x^2} dx = \frac{x}{2}\sqrt{a^2-x^2} + \frac{a^2}{2} \sin^{-1}\left(\frac{x}{a}\right)$
38. $\int \sqrt{a^2+x^2} dx = \frac{x}{2}\sqrt{a^2+x^2} + \frac{a^2}{2} \sinh^{-1}\left(\frac{x}{a}\right)$
39. $\int \sqrt{x^2-a^2} dx = \frac{x}{2}\sqrt{x^2-a^2} - \frac{a^2}{2} \cosh^{-1}\left(\frac{x}{a}\right)$
40. $\int \log x dx = x(\log x - 1) + C$
41. if $\frac{d}{dx}(f(x)) = f(x)$ then $\int f(x) dx = f(x) + C$

DIFFERENTIATION

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1. $\frac{d}{dx}(x^n) = n.x^{n-1}$
2. $\frac{d}{dx} e^x = e^x$
3. $\frac{d}{dx} a^x = a^x \log a$
4. $\frac{d}{dx} \log x = \frac{1}{x}$
5. $\frac{d}{dx} \sin x = \cos x$
6. $\frac{d}{dx} \cos x = -\sin x$
7. $\frac{d}{dx} \tan x = \sec^2 x$
8. $\frac{d}{dx} \cot x = -\operatorname{cosec}^2 x$
9. $\frac{d}{dx} \sec x = \sec x \tan x$
10. $\frac{d}{dx} \operatorname{cosec} x = -\operatorname{cosec} x \cot x$
11. $\frac{d}{dx} \sin^{-1}(x) = \frac{1}{\sqrt{1-x^2}}$
12. $\frac{d}{dx} \cos^{-1} x = \frac{-1}{\sqrt{1-x^2}}$
13. $\frac{d}{dx} \tan^{-1} x = \frac{1}{1+x^2}$
14. $\frac{d}{dx} \cot^{-1} x = \frac{-1}{1+x^2}$
15. $\frac{d}{dx} \sec^{-1} x = \frac{1}{|x|\sqrt{x^2-1}}$
16. $\frac{d}{dx} \operatorname{cosec}^{-1} x = \frac{-1}{|x|\sqrt{x^2-1}}$
17. $\frac{d}{dx} \sinh x = \cosh x$
18. $\frac{d}{dx} \cosh x = \sinh x$
19. $\frac{d}{dx} \tanh x = \operatorname{sech}^2 x$
20. $\frac{d}{dx} \coth x = -\operatorname{cosec}^2 h x$
21. $\frac{d}{dx} \operatorname{sech} x = -\operatorname{sech} x \tanh x$
22. $\frac{d}{dx} \operatorname{csch} x = -\operatorname{csch} x \coth x$
23. $\frac{d}{dx} \sinh^{-1} x = \frac{1}{\sqrt{1+x^2}}$
24. $\frac{d}{dx} \cosh^{-1} x = \frac{1}{\sqrt{x^2-1}}$
25. $\frac{d}{dx} \tanh^{-1} x = \frac{1}{1-x^2}$
26. $\frac{d}{dx} \coth^{-1} x = \frac{-1}{1-x^2}$
27. $\frac{d}{dx} \operatorname{sech}^{-1} x = \frac{-1}{x\sqrt{1-x^2}}$
28. $\frac{d}{dx} \operatorname{csch}^{-1} x = \frac{-1}{|x|\sqrt{1+x^2}}$
29. $\frac{d}{dx} \log_e f(x) = \frac{f'(x)}{f(x)}$
30. $\frac{d}{dx} \sqrt{f(x)} = \frac{f'(x)}{2\sqrt{f(x)}}$
31. $\frac{d}{dx}\{f(x)\}^n = n\{f(x)\}^{n-1} \cdot f'(x)$
32. $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$
33. $(uv)' = uv' + u'v$
34. $\left(\frac{u}{v}\right)' = \frac{vu' - uv'}{v^2}$