

Integrals & Integration Techniques You Should Know

General Facts About Integrals

1. If $g(x) = \frac{d}{dx}f(x)$, then $\int g(x) dx = f(x) + C$.
2. If a and b are constants, then $\int (af(x) + bg(x)) dx = a \int f(x) dx + b \int g(x) dx$.

Basic Integrals

3. $\int x^n dx = \frac{1}{n+1}x^{n+1} + C$ if $n \neq -1$
4. $\int \frac{1}{x} dx = \ln|x| + C$

Trig and Inverse Trig Integrals

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. $\int \csc^2(x) dx = -\cot(x) + C$
9. $\int \sec(x) \tan(x) dx = \sec(x) + C$
10. $\int \csc(x) \cot(x) dx = -\csc(x) + C$
11. $\int \frac{1}{x^2+1} dx = \tan^{-1}(x) + C$
12. $\int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1}(x) + C$

Exponentials

13. $\int a^x dx = \frac{1}{\ln(a)}a^x + C$
14. $\int e^x dx = e^x + C$

***u*-Substitution**

If $u = g(x)$, then $du = g'(x) dx$. Hence:

$$\int f(g(x))g'(x) dx = \int f(u) du.$$



this is equivalent to the chain rule!!