

MATH 134 Calculus 2 with FUNDamentals

Integration Formulas

$c, k \in \mathbb{R}$ are arbitrary constants

1. $\int 0 \, dx = c$, where c is an arbitrary constant

2. $\int k \, dx = kx + c$

3. **Power Rule:** $\int x^n \, dx = \frac{x^{n+1}}{n+1} + c$, where $n \neq -1$

4. $\int \frac{1}{x} \, dx = \ln|x| + c$

5. $\int e^x \, dx = e^x + c$ and more generally, $\int e^{kx} \, dx = \frac{1}{k}e^{kx} + c$, ($k \neq 0$)

6. $\int a^x \, dx = \frac{a^x}{\ln a} + c$ for any real number $a > 0$

7. $\int \sin x \, dx = -\cos x + c$ and more generally, $\int \sin(kx) \, dx = -\frac{1}{k}\cos(kx) + c$, ($k \neq 0$)

8. $\int \cos x \, dx = \sin x + c$ and more generally, $\int \cos(kx) \, dx = \frac{1}{k}\sin(kx) + c$, ($k \neq 0$)

9. $\int \sec^2 x \, dx = \tan x + c$

10. $\int \csc^2 x \, dx = -\cot x + c$

11. $\int \sec x \tan x \, dx = \sec x + c$

12. $\int \csc x \cot x \, dx = -\csc x + c$

13. $\int \tan x \, dx = -\ln|\cos x| + c = \ln|\sec x| + c$

14. $\int \sec x \, dx = \ln|\sec x + \tan x| + c$

15. $\int \frac{1}{\sqrt{1-x^2}} \, dx = \sin^{-1} x + c$

16. $\int \frac{1}{x^2+1} \, dx = \tan^{-1} x + c$

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17. **Linearity:** (i) $\int kf(x) dx = k \int f(x) dx$ (constants pull out)

(ii) $\int f(x) + g(x) dx = \int f(x) dx + \int g(x) dx$ (integral of a sum is the sum of the integrals)

18. **Integration by Parts:** $\int u dv = uv - \int v du$

19. **Important Trig Identities:**

(i) $\cos^2 \theta = \frac{1}{2}(1 + \cos(2\theta))$

(ii) $\sin^2 \theta = \frac{1}{2}(1 - \cos(2\theta))$

(iii) $\cos^2 \theta + \sin^2 \theta = 1$

(iv) $1 + \tan^2 \theta = \sec^2 \theta$

(v) $\sin(2\theta) = 2 \sin \theta \cos \theta$

20. **Partial Fractions:**

(i) $\frac{p(x)}{(x-a)(x-b)} = \frac{A}{x-a} + \frac{B}{x-b}$ Two Distinct Linear Factors

(ii) $\frac{p(x)}{(x-a)(x-b)(x-c)} = \frac{A}{x-a} + \frac{B}{x-b} + \frac{C}{x-c}$ Three Distinct Linear Factors