Formula for Integration

Polynomials

$$1.\int dx = x + c$$

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

$$3. \int x^n dx = \frac{1}{n+1} x^{n+1} + c, \ n \neq -1$$

4.
$$\int x^{-n} dx = \frac{1}{-n+1} x^{-n+1} + c, n \neq 1$$

$$5. \int \frac{1}{x} dx = \ln|x| + c$$

$$6. \int x^{-1} dx = \ln|x| + c$$

$$7.\int \frac{1}{ax+b} dx = \frac{1}{a} \ln|ax+b| + c$$

$$8.\int x^{\frac{p}{q}}dx = \frac{1}{\frac{p}{q}+1}x^{\frac{p}{q}+1} + c$$

Algebraic

$$1.\int \frac{1}{\sqrt{a^2 - x^2}} dx = \sin^{-1} \left(\frac{x}{a}\right) + c$$

$$2. \int \frac{1}{\sqrt{a^2 + x^2}} dx = \ln(x + \sqrt{x^2 + a^2}) + c$$

$$3. \int \frac{1}{\sqrt{x^2 - a^2}} dx = \ln|x + \sqrt{x^2 - a^2}| + c$$

$$4.\int \frac{1}{a^2 + x^2} dx = \frac{1}{a} tan^{-1} \left(\frac{x}{a}\right) + c$$

6.
$$\int \frac{1}{a^2 - x^2} dx = \frac{1}{2a} \ln \left| \frac{a + x}{a - x} \right| + c$$

$$7.\int \frac{1}{x^2 - a^2} dx = \frac{1}{2a} \ln \left| \frac{x - a}{x + a} \right| + c$$

Logarithmic and Exponential

$$1.\int e^x dx = e^x + c$$

$$2. \int a^x dx = \frac{a^x}{\ln a} + c$$

$$3. \int \ln x \, dx = x \ln(x) - x + c$$

$$4.\int xe^x dx = (x-1)e^x + c$$

$$5.\int \frac{1}{x \ln(x)} dx = \ln|\ln x| + c$$

$$6.\int e^{mx} dx = \frac{1}{m}e^{mx} + c$$

7.
$$\int e^{ax} \sin bx \, dx = \frac{e^{ax}}{a^2 + b^2}$$
$$(a \sin bx - b \cos bx) + c$$

8.
$$\int e^{ax} \cos bx \, dx = \frac{e^{ax}}{a^2 + b^2}$$
$$(a \sin bx + b \cos bx) + c$$

Trigonometric

$$1.\int sinxdx = -cosx + c$$

$$2. \int cosxdx = sinx + c$$

$$3. \int secx tanxdx = secx + c$$

$$4. \int cosecx \ cotx dx = -cosec \ x + c$$

$$5. \int \sec^2 x \, dx = \tan x + c$$

$$6. \int \csc^2 x \, dx = -\cot x + c$$

$$7.\int tanx \, dx = \ln|\sec x| + c$$

8.
$$\int \cot x \, dx = \ln|\sin x| + c$$

$$9. \int \sec x dx = \ln|\sec x + \tan x| + c$$

$$10. \int cosecx dx = \ln|cosec x - cotx| + c$$

Formula for Differentiation

Polynomials

$$1.\frac{d}{dx}(c) = 0$$

$$2.\frac{d}{dx}(x) = 1$$

$$3.\frac{d}{dx}(cx) = c$$

olynomials
$$1 \cdot \frac{d}{dx}(c) = 0$$

$$2 \cdot \frac{d}{dx}(x) = 1$$

$$3 \cdot \frac{d}{dx}(cx) = c$$

$$4 \cdot \frac{d}{dx}(x^{n}) = nx^{n-1}$$

$$5 \cdot \frac{d}{dx}(cx^{n}) = ncx^{n-1}$$

$$5.\frac{d}{dx}(cx^n) = ncx^{n-1}$$

$$6. \frac{d}{dx}(\sqrt[dx]{x}) = \frac{1}{2\sqrt{x}}$$

Trigonometric

1.
$$\frac{d}{d}(\sin x) = \cos x$$

$$2. \quad \frac{\frac{dx}{dx}}{dx}(\cos x) = -\sin x$$

3.
$$\frac{d}{dx}(tanx) = sec^2x$$

4.
$$\frac{d}{dx}(cotx) = -cosec^2x$$

5.
$$\frac{d}{dx}(secx) = secx tanx$$

6.
$$\frac{dx}{dx}(cosecx) = -cosecx cotx$$

7.
$$\frac{d}{dx}(\sin^2 x) = 2\sin x \cos x$$

$$8. \quad \frac{dx}{dx}(\cos^2 x) = -2\cos x \sin x$$

9.
$$\frac{d}{dx}(tan^2x) = 2tanx sec^2x$$

10.
$$\frac{dx}{dx}(\cot^2 x) = -2\cot x \csc^2 x$$

11.
$$\frac{d}{dx}(sec^2x) = 2 sec^2x tanx$$

rigonometric

1.
$$\frac{d}{dx}(sinx) = cosx$$

2. $\frac{d}{dx}(cosx) = -sinx$

3. $\frac{d}{dx}(tanx) = sec^2x$

4. $\frac{d}{dx}(cotx) = -cosec^2x$

5. $\frac{d}{dx}(secx) = secx tanx$

6. $\frac{d}{dx}(cosecx) = -cosecx cotx$

7. $\frac{d}{dx}(sin^2x) = 2sinx cosx$

8. $\frac{d}{dx}(cos^2x) = -2cosx sinx$

9. $\frac{d}{dx}(tan^2x) = 2tanx sec^2x$

10. $\frac{d}{dx}(cot^2x) = -2cotx cosec^2x$

11. $\frac{d}{dx}(sec^2x) = 2sec^2x tanx$

12. $\frac{d}{dx}(cosec^2x) = -2cosec^2x cotx$

13. $\frac{d}{dx}(sinmx) = mcosmx$

14. $\frac{d}{dx}(cos^2x) = -3sin^2x$

13.
$$\frac{d}{dx}(sinmx) = mcosmx$$

$$14. \frac{d}{dx}(\cos 3x) = -3\sin 3x$$

Inverse Trigonometric

1.
$$\frac{d}{dx}(\sin^{-1}x) = \frac{1}{\sqrt{1-x^2}}$$

2.
$$\frac{d}{dx}(\cos^{-1}x) = -\frac{1}{\sqrt{1-x^2}}$$

3.
$$\frac{d}{dx}(tan^{-1}x) = \frac{1}{1+x^2}$$

4.
$$\frac{dx}{dx}(\cot^{-1}x) = -\frac{1}{1+x^2}$$

5.
$$\frac{dx}{dx}(sec^{-1}x) = \frac{1}{|x|\sqrt{x^2-1}}$$

2.
$$\frac{d}{dx}(\cos^{-1}x) = -\frac{1}{\sqrt{1-x^2}}$$
3.
$$\frac{d}{dx}(\tan^{-1}x) = \frac{1}{1+x^2}$$
4.
$$\frac{d}{dx}(\cot^{-1}x) = -\frac{1}{1+x^2}$$
5.
$$\frac{d}{dx}(\sec^{-1}x) = \frac{1}{|x|\sqrt{x^2-1}}$$
6.
$$\frac{d}{dx}(\csc^{-1}x) = -\frac{1}{|x|\sqrt{x^2-1}}$$

Exponential and Logarithmic

$$1. \quad \frac{d}{dx}(e^x) = e^x$$

$$2. \quad \frac{d}{dx}(a^x) = a^x \ln(a),$$

2.
$$\frac{d}{dx}(e^{x}) = e^{x}\ln(a),$$
3.
$$\frac{d}{dx}(\ln(x)) = \frac{1}{x}, \quad x>0$$
4.
$$\frac{d}{dx}(\ln|x|) = \frac{1}{x}, \quad x \neq 0$$
5.
$$\frac{d}{dx}(\log_{a}x) = \frac{1}{x\ln a}, \quad x>0$$
6.
$$\frac{d}{dx}(e^{mx}) = me^{mx}$$

4.
$$\frac{dx}{dx}(\ln|x|) = \frac{1}{x}$$
, $x \neq 0$

5.
$$\frac{d}{dx}(log_a x) = \frac{1}{xlna}$$
, x>0

6.
$$\frac{d}{dx}(e^{mx}) = me^{mx}$$