

## Formula for Integration

<u>Polynomials</u>	<u>Algebraic</u>
$1. \int dx = x + c$ $2. \int k dx = kx + c$ $3. \int x^n dx = \frac{1}{n+1} x^{n+1} + c, n \neq -1$ $4. \int x^{-n} dx = \frac{1}{-n+1} x^{-n+1} + c, n \neq 1$ $5. \int \frac{1}{x} dx = \ln x  + c$ $6. \int x^{-1} dx = \ln x  + c$ $7. \int \frac{1}{ax+b} dx = \frac{1}{a} \ln ax+b  + c$ $8. \int x^{\frac{p}{q}} dx = \frac{1}{\frac{p}{q}+1} x^{\frac{p}{q}+1} + c$	$1. \int \frac{1}{\sqrt{a^2-x^2}} dx = \sin^{-1}\left(\frac{x}{a}\right) + c$ $2. \int \frac{1}{\sqrt{a^2+x^2}} dx = \ln(x + \sqrt{x^2 + a^2}) + c$ $3. \int \frac{1}{\sqrt{x^2-a^2}} dx = \ln x + \sqrt{x^2 - a^2}  + c$ $4. \int \frac{1}{a^2+x^2} dx = \frac{1}{a} \tan^{-1}\left(\frac{x}{a}\right) + c$ $6. \int \frac{1}{a^2-x^2} dx = \frac{1}{2a} \ln\left \frac{a+x}{a-x}\right  + c$ $7. \int \frac{1}{x^2-a^2} dx = \frac{1}{2a} \ln\left \frac{x-a}{x+a}\right  + c$
<u>Logarithmic and Exponential</u>	<u>Trigonometric</u>
$1. \int e^x dx = e^x + c$ $2. \int a^x dx = \frac{a^x}{\ln a} + c$ $3. \int \ln x dx = x \ln(x) - x + c$ $4. \int x e^x dx = (x-1)e^x + c$ $5. \int \frac{1}{x \ln(x)} dx = \ln \ln x  + c$ $6. \int e^{mx} dx = \frac{1}{m} e^{mx} + c$ $7. \int e^{ax} \sin bx dx = \frac{e^{ax}}{a^2+b^2} (a \sin bx - b \cos bx) + c$ $8. \int e^{ax} \cos bx dx = \frac{e^{ax}}{a^2+b^2} (a \sin bx + b \cos bx) + c$	$1. \int \sin x dx = -\cos x + c$ $2. \int \cos x dx = \sin x + c$ $3. \int \sec x \tan x dx = \sec x + c$ $4. \int \operatorname{cosec} x \cot x dx = -\operatorname{cosec} x + c$ $5. \int \sec^2 x dx = \tan x + c$ $6. \int \operatorname{cosec}^2 x dx = -\cot x + c$ $7. \int \tan x dx = \ln \sec x  + c$ $8. \int \cot x dx = \ln \sin x  + c$ $9. \int \sec x dx = \ln \sec x + \tan x  + c$ $10. \int \operatorname{cosec} x dx = \ln \operatorname{cosec} x - \cot x  + c$

### Formula for Differentiation

<p><b>Polynomials</b></p> <ol style="list-style-type: none"> <li>1. <math>\frac{d}{dx}(c) = 0</math></li> <li>2. <math>\frac{d}{dx}(x) = 1</math></li> <li>3. <math>\frac{d}{dx}(cx) = c</math></li> <li>4. <math>\frac{d}{dx}(x^n) = nx^{n-1}</math></li> <li>5. <math>\frac{d}{dx}(cx^n) = ncx^{n-1}</math></li> <li>6. <math>\frac{d}{dx}(\sqrt{x}) = \frac{1}{2\sqrt{x}}</math></li> </ol>	<p><b>Trigonometric</b></p> <ol style="list-style-type: none"> <li>1. <math>\frac{d}{dx}(\sin x) = \cos x</math></li> <li>2. <math>\frac{d}{dx}(\cos x) = -\sin x</math></li> <li>3. <math>\frac{d}{dx}(\tan x) = \sec^2 x</math></li> <li>4. <math>\frac{d}{dx}(\cot x) = -\operatorname{cosec}^2 x</math></li> <li>5. <math>\frac{d}{dx}(\sec x) = \sec x \tan x</math></li> <li>6. <math>\frac{d}{dx}(\operatorname{cosec} x) = -\operatorname{cosec} x \cot x</math></li> <li>7. <math>\frac{d}{dx}(\sin^2 x) = 2 \sin x \cos x</math></li> <li>8. <math>\frac{d}{dx}(\cos^2 x) = -2 \cos x \sin x</math></li> <li>9. <math>\frac{d}{dx}(\tan^2 x) = 2 \tan x \sec^2 x</math></li> <li>10. <math>\frac{d}{dx}(\cot^2 x) = -2 \cot x \operatorname{cosec}^2 x</math></li> <li>11. <math>\frac{d}{dx}(\sec^2 x) = 2 \sec^2 x \tan x</math></li> <li>12. <math>\frac{d}{dx}(\operatorname{cosec}^2 x) = -2 \operatorname{cosec}^2 x \cot x</math></li> <li>13. <math>\frac{d}{dx}(\sin mx) = m \cos mx</math></li> <li>14. <math>\frac{d}{dx}(\cos 3x) = -3 \sin 3x</math></li> </ol>
<p><b>Inverse Trigonometric</b></p> <ol style="list-style-type: none"> <li>1. <math>\frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}</math></li> <li>2. <math>\frac{d}{dx}(\cos^{-1} x) = -\frac{1}{\sqrt{1-x^2}}</math></li> <li>3. <math>\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}</math></li> <li>4. <math>\frac{d}{dx}(\cot^{-1} x) = -\frac{1}{1+x^2}</math></li> <li>5. <math>\frac{d}{dx}(\sec^{-1} x) = \frac{1}{ x \sqrt{x^2-1}}</math></li> <li>6. <math>\frac{d}{dx}(\operatorname{cosec}^{-1} x) = -\frac{1}{ x \sqrt{x^2-1}}</math></li> </ol>	<p><b>Exponential and Logarithmic</b></p> <ol style="list-style-type: none"> <li>1. <math>\frac{d}{dx}(e^x) = e^x</math></li> <li>2. <math>\frac{d}{dx}(a^x) = a^x \ln(a),</math></li> <li>3. <math>\frac{d}{dx}(\ln(x)) = \frac{1}{x}, \quad x &gt; 0</math></li> <li>4. <math>\frac{d}{dx}(\ln x ) = \frac{1}{x}, \quad x \neq 0</math></li> <li>5. <math>\frac{d}{dx}(\log_a x) = \frac{1}{x \ln a}, \quad x &gt; 0</math></li> <li>6. <math>\frac{d}{dx}(e^{mx}) = me^{mx}</math></li> </ol>