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Calculus Formulas
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Derivatives: Basic Properties & Rules

- **Constant Multiple:** $\frac{d}{dx}(cf(x)) = cf'(x)$
- **Sum/Difference:** $(f(x) \pm g(x))' = f'(x) \pm g'(x)$
- **Power Rule:** $\frac{d}{dx}(x^n) = nx^{n-1}$
- **Constant Rule:** $\frac{d}{dx}(c) = 0$
- **Product Rule:** $(fg)' = f'g + fg'$
- **Quotient Rule:** $\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$
- **Chain Rule:** $\frac{d}{dx}(f(g(x))) = f'(g(x))g'(x)$
- **Chain Rule (Exponential):** $\frac{d}{dx}(e^{g(x)}) = g'(x)e^{g(x)}$
- **Chain Rule (Logarithm):** $\frac{d}{dx}(\ln(g(x))) = \frac{g'(x)}{g(x)}$

Common Derivatives

- **Constant:** $\frac{d}{dx}(c) = 0$
- **Identity:** $\frac{d}{dx}(x) = 1$
- **Linear:** $\frac{d}{dx}(cx) = c$
- **Power:** $\frac{d}{dx}(x^n) = nx^{n-1}$
- **Constant Power:** $\frac{d}{dx}(cx^n) = ncx^{n-1}$
- **Sine:** $\frac{d}{dx}(\sin x) = \cos x$
- **Cosine:** $\frac{d}{dx}(\cos x) = -\sin x$
- **Tangent:** $\frac{d}{dx}(\tan x) = \sec^2 x$
- **Secant:** $\frac{d}{dx}(\sec x) = \sec x \tan x$
- **Cosecant:** $\frac{d}{dx}(\csc x) = -\csc x \cot x$
- **Cotangent:** $\frac{d}{dx}(\cot x) = -\csc^2 x$
- **Inverse Sine:** $\frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$
- **Inverse Cosine:** $\frac{d}{dx}(\cos^{-1} x) = -\frac{1}{\sqrt{1-x^2}}$
- **Inverse Tangent:** $\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$
- **Inverse Secant:** $\frac{d}{dx}(\sec^{-1} x) = \frac{1}{\lvert x\rvert\sqrt{x^2-1}}$
- **Inverse Cosecant:** $\frac{d}{dx}(\csc^{-1} x) = -\frac{1}{\lvert x\rvert\sqrt{x^2-1}}$
- **Inverse Cotangent:** $\frac{d}{dx}(\cot^{-1} x) = -\frac{1}{1+x^2}$
- **Exponential (Base a):** $\frac{d}{dx}(a^x) = a^x \ln(a)$
- **Exponential (Base e):** $\frac{d}{dx}(e^x) = e^x$
- **Natural Log:** $\frac{d}{dx}(\ln(x)) = \frac{1}{x}, \quad x > 0$
- **Natural Log Abs. Value:** $\frac{d}{dx}(\ln\lvert x\rvert) = \frac{1}{x}, \quad x \neq 0$
- **Logarithm (Base a):** $\frac{d}{dx}(\log_a x) = \frac{1}{x \ln a}$

Common Integrals

- **Constant:** $\int k\,dx = kx + c$
- **dx:** $\int dx = x + c$
- **Power Rule:** $\int x^n\,dx = \frac{x^{n+1}}{n+1} + c, \quad n \neq -1$
- **Negative Power Rule:** $\int x^{-n}\,dx = \frac{x^{-n+1}}{-n+1} + c, \quad n \neq 1$
- **Rational Power Rule:** $\int x^{\frac{p}{q}}\,dx = \frac{q}{p+q}x^{\frac{p+q}{q}} + c$
- **Reciprocal:** $\int \frac{1}{x}\,dx = \ln|x| + c$
- **Linear Reciprocal:** $\int \frac{1}{ax+b}\,dx = \frac{1}{a}\ln|ax+b| + c$
- **Cosine:** $\int \cos u\,du = \sin u + c$
- **Sine:** $\int \sin u\,du = -\cos u + c$
- **Secant Squared:** $\int \sec^2 u\,du = \tan u + c$
- **Secant-Tangent:** $\int \sec u \tan u\,du = \sec u + c$
- **Cosecant-Cotangent:** $\int \csc u \cot u\,du = -\csc u + c$
- **Cosecant Squared:** $\int \csc^2 u\,du = -\cot u + c$
- **Tangent:** $\int \tan u\,du = \ln|\sec u| + c$
- **Cotangent:** $\int \cot u\,du = \ln|\sin u| + c$
- **Exponential (Base e):** $\int e^u\,du = e^u + c$
- **Exponential (Base a):** $\int a^u\,du = \frac{a^u}{\ln a} + c$
- **Natural Log:** $\int \ln u\,du = u\ln(u) - u + c$

Standard Integration Techniques

- **u-Substitution:** $\int_a^b f(g(x))g'(x)\,dx = \int_{g(a)}^{g(b)} f(u)\,du$
- **Integration by Parts:** $\int u\,dv = uv - \int v\,du$
- **Definite Integration by Parts:** $\int_a^b u\,dv = uv\Big|_a^b - \int_a^b v\,du$
- **Trig Sub: Sine:** $\sqrt{a^2 - b^2x^2} \Rightarrow x = \frac{a}{b}\sin\theta$
- **Trig Sub: Secant:** $\sqrt{b^2x^2 - a^2} \Rightarrow x = \frac{a}{b}\sec\theta$
- **Trig Sub: Tangent:** $\sqrt{a^2 + b^2x^2} \Rightarrow x = \frac{a}{b}\tan\theta$

Partial Fractions Expansion

Factor in $Q(x)$	Term in P.F.E.
$ax + b$	$\frac{A}{ax+b}$
$(ax + b)^k$	$\frac{A_1}{ax+b} + \frac{A_2}{(ax+b)^2} + \cdots + \frac{A_k}{(ax+b)^k}$
$ax^2 + bx + c$	$\frac{Ax+B}{ax^2+bx+c}$
$(ax^2 + bx + c)^k$	$\frac{A_1x+B_1}{ax^2+bx+c} + \cdots + \frac{A_kx+B_k}{(ax^2+bx+c)^k}$

Calculus konu anlatımı ve soru çözümleri için QR'ı okut.

Buraya tıkla, konu anlatımı ve soru çözümlerini izle.