$D > 0$, $f_{xx} < 0$, maxima

$\Rightarrow f_{xx} = \dfrac{2b^3}{a^3}$, $a < 0$, $b > 0$

$f_{xx} < 0$, $D > 0$, maxima

$\Rightarrow f_{xx} = \dfrac{2b^3}{a^3}$ $a < 0$, $b < 0$

$D > 0$, $f_{xx} > 0$ max

——— x ——— x ——— x ——

$$\cos\alpha\cos\beta = \frac{1}{2}\left[\cos(\alpha-\beta) + \cos(\alpha+\beta)\right]$$

2

$$\cos\alpha\sin\beta = \frac{1}{2}\left[\sin(\alpha+\beta) - \sin(\alpha-\beta)\right]$$

$$\sin\alpha\cos\beta = \frac{1}{2}\left[\sin(\alpha+\beta) + \sin(\alpha-\beta)\right]$$

$$\sin\alpha\sin\beta = \frac{1}{2}\left[\cos(\alpha-\beta) - \cos(\alpha+\beta)\right]$$

- $\int a^x \, dx = \frac{a^x}{\ln a} + c$
- $\int a^{\square} \, d\square = \frac{a^{\square}}{\ln a} + c$

INTEGRAL OF TRIGNOMETRIC FUNCTION

- $\int \sin x \, dx = -\cos x + c$
- $\int \cos x \, dx = \sin x + c$
- $\int \tan x \, dx = \ln \sec x + c$
- $\int \cot x \, dx = \ln \sin x + c$
- $\int \sec x \, dx = \ln(\sec x + \tan x) + c$
- $\int \quad = \ln \tan\left(\frac{x}{2} + \frac{\pi}{4}\right) + c$
- $\int \operatorname{cosec} x \, dx = \ln(\operatorname{cosec} x - \cot x) + c$

  $= \ln\left(\tan \frac{x}{2}\right) + c$

- $\int \sec^2 x \, dx = \tan x + c$
- $\int \operatorname{cosec}^2 x \, dx = -\cot x + c$

- $\int \sec x \cdot \tan x \, dx = \sec x + c$
- $\int \operatorname{cosec} x \cdot \cot x \, dx = -\operatorname{cosec} x + c$

- $\sin^2\theta = \frac{1 - \cos 2\theta}{2}$
- $\cos^2\theta = \frac{1 + \cos 2\theta}{2}$
- $\cos^2\square = \frac{1 + \cos 2\square}{2}$

- $1 - \cos\square = 2\sin^2\frac{\square}{2}$
- $1 + \cos\square = 2\cos^2\frac{\square}{2}$

CONVERSION FORMULA

- $A > B$ شرط
- $\sin A \cos B = \frac{1}{2}[\sin(A+B) + \sin(A-B)]$
- $\cos A \sin B = \frac{1}{2}[\sin(A+B) - \sin(A-B)]$

- $\cos A \cos B = \frac{1}{2}[\cos(A+B) + \cos(A-B)]$
- $\sin A \sin B = -\frac{1}{2}[\cos(A+B) - \cos(A-B)]$

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

INTEG. BY PARTS

$\int u \cdot v \, dx = u \int v \, dx - \int \left[\frac{du}{dx} \int v \, dx\right] dx$

KAAM KI BAAT :

Agr angle other x hoa to angle ka derivative phir se lena parega.

$$\frac{d}{dx} \sin 4x^2 = \cos 4x^2 \frac{d}{dx}(4x^2)$$

$$= 8x \cdot \cos 4x^2$$

"INVERSE TRIGONOMETRIC FUNCTION"

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

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

$$\frac{d}{dx} \tan^{-1}x = \frac{1}{x^2+1}$$

$$\frac{d}{dx} \cot^{-1}x = -\frac{1}{x^2+1}$$

$$\frac{d}{dx} \sec^{-1}x = \frac{1}{x\sqrt{x^2-1}}$$

$$\frac{d}{dx} \operatorname{cosec}^{-1}x = -\frac{1}{x\sqrt{x^2-1}}$$

$$\boxed{\log x = 0.4343 \cdot \ln x}$$

$$\frac{d}{dx} \sin^{-1}\square = \frac{1}{\sqrt{1-\square^2}} \frac{d}{dx}\square$$

$$\frac{d}{dx} \ln(x)$$

$$\frac{d}{dx} \ln x = \frac{1}{x}$$

$$\frac{d}{dx} \ln\square = \frac{1}{\square} \cdot \frac{d}{dx}\square$$

"EXPONENTIAL FUNCTION"

$$\frac{d}{dx} e^x = e^x$$

$$\frac{d}{dx} e^\square = e^\square \frac{d}{dx}\square$$

$$\boxed{\begin{aligned} \frac{d}{dx} y &= \frac{dy}{dx} \\ \frac{d}{dx} y^n &= ny^{n-1}\frac{dy}{dx} \end{aligned}}$$

Date

$\sqrt{2}i$

$$\int \frac{dx}{\sqrt{a^2-x^2}} = \sin^{-1}\frac{x}{a} + C$$

$$\int \frac{dx}{x\sqrt{x^2-a^2}} = \frac{1}{a}\sec^{-1}\frac{x}{a} + C$$

$$\int \frac{dx}{a^2+x^2} = \frac{1}{a}\tan^{-1}\frac{x}{a} + C$$

$$\int \frac{dx}{x^2-a^2} = \frac{1}{2a}\ln\left(\frac{x-a}{x+a}\right) + C$$

$$\int \frac{dx}{a^2-x^2} = \frac{1}{2a}\ln\left(\frac{a+x}{a-x}\right) + C$$

$$\int \frac{dx}{\sqrt{x^2+a^2}} = \ln\left(x+\sqrt{x^2+a^2}\right)$$

$$\int \frac{1}{\sqrt{x^2-a^2}} = \ln\left(x+\sqrt{x^2-a^2}\right)$$

Date

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

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

$$\int U\,dV = UV - \int V\,du$$

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

hyperbolic mein sirf $\int \sinh = \cosh$ or $\int \operatorname{sech}x \tanh x = -\operatorname{sech}x$

sirf indon k sign chng hote hai.

$$\int \tan^n x\,dx = \frac{\tan^{n-1}x}{n-1} - \int \tan^{n-2}x\,dx$$

$$\int \sec^n x\,dx = \frac{\sec^{n-2}x \tan x}{n-1} + \frac{n-2}{n-1}\int \sec^{n-2}x\,dx$$

→ $T(t) = (T_0 - T_s)e^{kt} + T_s$

→ $P(t) = P_0 e^{kt}$

→ $L\frac{di}{dt} + Ri = E(t) \rightarrow LR$

→ $R\frac{dq}{dt} + \frac{1}{c}q = E(t) \rightarrow RC$

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

→ $P(t) = \frac{aP_0}{(a-bP_0)e^{-at} + bP_0}$

→ Absolute Error = |Actual − Approximate|

↳ function by direct putting values

↳ from Euler

→ % Relative = $\left|\frac{\text{Actual} - \text{Appro.}}{\text{Actual}}\right| \times 100$