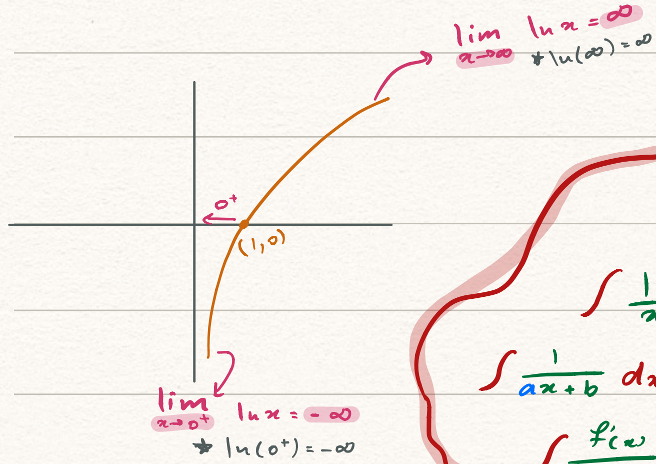
$y = \ln x$

natural logarithm



$\int dx$

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

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

$$\int \frac{f'(x)}{f(x)}\, dx = \ln|f(x)| + c$$

D_x

$$D_x \ln x = \frac{1}{x}$$

$$D_x \ln f(x) = \frac{f'(x)}{f(x)}$$

$$\ln pq = \ln p + \ln q$$

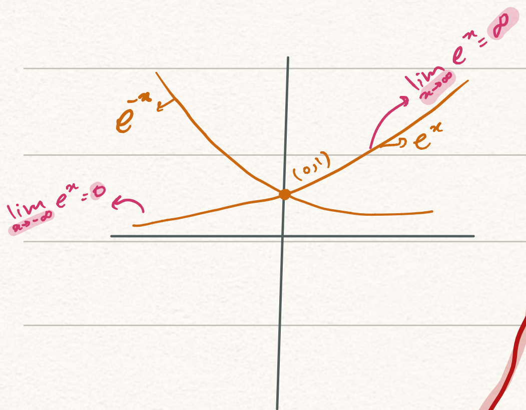
$$\ln \frac{p}{q} = \ln p - \ln q$$

$$\ln p^r = r \ln p$$

$$e^x = y \longleftrightarrow \ln y = x$$

$y = e^x$

natural exponential



$$\ln e^x = x$$

$$e^{\ln x} = x$$

D_x

$$D_x e^{f(x)} = f'(x)\, e^{f(x)}$$

$\int dx$

$$\int e^x\, dx = e^x + c$$

$$\int e^{ax+b}\, dx = \frac{1}{a} e^{ax+b} + c$$

$$\int f'(x) e^{f(x)}\, dx = e^{f(x)} + c$$

$$e^p \cdot e^q = e^{p+q}$$

$$\frac{e^p}{e^q} = e^{p-q}$$

$$(e^p)^r = e^{pr}$$

$y = a^x$

general exponential

D_x

$$D_x a^x = a^x \cdot \ln a$$

$$D_x a^{f(x)} = a^{f(x)} \cdot \ln a \cdot f'(x)$$

$$a^x = e^{x \ln a}$$

$\int dx$

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

$$\int a^{bx+c}\, dx = \frac{1}{b}\, \frac{a^{bx+c}}{\ln a} + c$$

$$\int a^{f(x)} f'(x)\, dx = \frac{a^{f(x)}}{\ln a} + c$$

$$y = \log_a x$$

general logarithm

$$\log_a x = \frac{\ln x}{\ln a}$$

$$\log_a x = y \longleftrightarrow a^y = x$$

D_x

$$D_x \log_a x = \frac{1}{\ln a} \cdot \frac{1}{x}$$

$$D_x \log_a |f(x)| = \frac{f'(x)}{\ln a \cdot f(x)}$$

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x^c — كثيرة الحدود

2^x — أسية عامة

$x^x \rightarrow e^{\ln x^x} = e^{x \ln x}$ → نشتقها

by Eng: Shahad Sulaiman