

$$\cos^2 x + \sin^2 x = 1$$

$$\begin{aligned} 1 - \sin^2 x &= (1 + \sin x)(1 - \sin x) \\ &= \cos^2 x \end{aligned}$$

$$\begin{aligned} 1 - \cos^2 x &= (1 + \cos x)(1 - \cos x) \\ &= \sin^2 x \end{aligned}$$

$$\tan x = \frac{\sin x}{\cos x}$$

$$1 + \tan^2 x = \frac{1}{\cos^2 x}$$

$$(\therefore \frac{\cos^2 x}{\cos^2 x} + \frac{\sin^2 x}{\cos^2 x} = \frac{1}{\cos^2 x})$$

$$1 + \frac{1}{\tan^2 x} = \frac{1}{\sin^2 x}$$

$$\tan^2 x = \frac{1}{\cos^2 x} - 1$$

$$\cos^2 x = \frac{1}{1 + \tan^2 x}$$

$$\begin{aligned}
\sin x &= 2 \sin \frac{x}{2} \cos \frac{x}{2} \\
\sin x \cos x &= \frac{1}{2} \sin 2x \\
\cos^2 x - \sin^2 x &= \cos 2x \\
&= (\cos x - \sin x)(\cos x + \sin x) \\
&= 1 - 2 \cos^2 x \\
&= 2 \sin^2 x - 1 \\
\sin^2 x &= \frac{1 - \cos 2x}{2} \\
\cos^2 x &= \frac{1 + \cos 2x}{2} \\
1 + \cos x &= 2 \cos^2 \frac{x}{2} \\
1 - \cos x &= 2 \sin^2 \frac{x}{2} \\
\frac{1 - \cos x}{1 + \cos x} &= \tan^2 \frac{x}{2} \\
\sin 2x &= (\sin^2 x)' = (1 - \cos^2 x)' = (-\cos^2 x)' = 2 \sin x \cos x \\
(\sin x + \cos x)' &= \cos x - \sin x \\
\sin^{-1} x &= \arcsin x \\
\cos^{-1} x &= \arccos x \\
\tan^{-1} x &= \arctan x \\
\sinh x &= \frac{e^x - e^{-x}}{2} \\
\cosh x &= \frac{e^x + e^{-x}}{2} \\
\tanh x &= \frac{e^x - e^{-x}}{e^x + e^{-x}} \\
\cosh^2 x - \sinh^2 x &= 1
\end{aligned}$$

$$x = \sinh t$$

$$e^t - e^{-t} - 2x = 0$$

$$e^{2t} - 2e^t x - 1 = 0$$

$$e^t = x + \sqrt{1 + x^2} \ (\because e^t > 0)$$

$$t = \log \left(x + \sqrt{1 + x^2} \right)$$

$$x = \cosh t$$

$$e^t + e^{-t} - 2x = 0$$

$$e^{2t} + 2e^t x - 1 = 0$$

$$e^t = -x \pm \sqrt{1 + x^2}$$

$$t = \log \left(-x \pm \sqrt{1 + x^2} \right)$$

$$y = a$$

$$y = x^r$$

$$y = \sqrt{x}$$

$$y = \frac{1}{x}$$

$$y = \sin x$$

$$y = \cos x$$

$$y = \tan x$$

$$y = e^x$$

$$y = \log x$$

$$y = a^x$$

$$y = f(g(x))$$

$$y = f(x)g(x)$$

$$y = \frac{f(x)}{g(x)}$$

$$y = x^x$$

$$y = \int_0^x f(t) \, dt$$

$$x^2 + y^2 = 1$$

$$x = f(y)$$

$$\begin{cases} x = f(t) \\ y = g(t) \end{cases}$$

$$\int x^r dx \ (r \neq -1)$$

$$\int \frac{1}{x} dx$$

$$\int e^x dx$$

$$\int \log x dx$$

$$\int \sin x dx$$

$$\int \cos x dx$$

$$\int \tan x dx$$

$$\int \frac{dx}{\tan x}$$

$$\int \frac{dx}{\cos^2 x}$$

$$\int \frac{dx}{\sin^2 x}$$

$$\int a^x dx \ (a > 0, a \neq 1)$$

$$\frac{dy}{dx} = 0$$

$$\frac{dy}{dx} = rx^{r-1}$$

$$\frac{dy}{dx} = \frac{1}{2\sqrt{x}}$$

$$\frac{dy}{dx} = -\frac{1}{x^2}$$

$$\frac{dy}{dx} = \cos x$$

$$\frac{dy}{dx} = -\sin x$$

$$\frac{dy}{dx} = \frac{1}{\cos^2 x}$$

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

$$\frac{dy}{dx} = \frac{1}{x}$$

$$\frac{dy}{dx} = a^x \log a$$

$$\frac{dy}{dx} = f'(g(x)) \cdot g'(x)$$

$$\frac{dy}{dx} = f'(x)g(x) + f(x)g'(x)$$

$$\frac{dy}{dx} = \frac{f'(x)g(x) - f(x)g'(x)}{(g(x))^2}$$

$$\frac{dy}{dx} = x^x(1 + \log x)$$

$$\frac{dy}{dx} = f(x)$$

$$\frac{dy}{dx} = \frac{x}{y}$$

$$\frac{dy}{dx} = \frac{1}{f'(y)}$$

$$\frac{dy}{dx} = \frac{f'(t)}{g'(t)}$$

$$\begin{aligned}
\int x^r dx \ (r \neq -1) &= \frac{1}{r+1} x^{r+1} + C \\
\int \frac{1}{x} dx &= \log x + C \\
\int e^x dx &= e^x + C \\
\int \log x dx &= x \log x - x + C \\
\int \sin x dx &= -\cos x + C \\
\int \cos x dx &= \sin x + C \\
\int \tan x dx &= -\log|\cos x| + C \\
\int \frac{dx}{\tan x} &= \log|\sin x| + C \\
\int \frac{dx}{\cos^2 x} &= \tan x + C \\
\int \frac{dx}{\sin^2 x} &= -\frac{1}{\tan x} + C \\
\int a^x dx \ (a > 0, a \neq 1) &= \frac{a^x}{\log a} + C
\end{aligned}$$