

$$\int F'(x) dx = \int f(x) dx = F(x) + c$$

$$\int f'(x) dx = \int f(x) + c$$

$$\int a f(x) dx = a \int f(x) dx$$

$$\int (f(x) \pm g(x)) dx = \int f(x) dx \pm \int g(x) dx$$

$$\int x^a dx = \frac{1}{a+1} x^{a+1} + c, \quad a \neq 0$$

$$\int f(g(x)) g'(x) dx = \int f(u) du = F(u) + c = F(g(x)) + c$$

$$\int (ax + b)^n dx = \frac{1}{a(n+1)} (ax + b)^{n+1} + c$$

$$\int \sin ax dx = -\frac{1}{a} \cos ax + c, \quad a \neq 0$$

$$\int \cos ax dx = \frac{1}{a} \sin ax + c, \quad a \neq 0$$

$$\int (1 + \tan^2 ax) dx = \frac{1}{a} \tan ax + c, \quad a \neq 0$$

$$\int (1 + \cot^2 ax) dx = -\frac{1}{a} \cot ax + c, \quad a \neq 0$$

$$\int \tan ax dx = -\frac{1}{a} \ln |\cos ax| + c, \quad a \neq 0$$

$$\int \cot ax dx = \frac{1}{a} \ln |\sin ax| + c, \quad a \neq 0$$

$$\int \sin ax \cos bx dx = \frac{1}{2} \left[\frac{1}{b-a} \cos(a-b)x - \frac{1}{a+b} \cos(a+b)x \right] + c, \quad a \neq b$$

$$\int \sin ax \sin bx dx = \frac{1}{2} \left[\frac{1}{b-a} \sin(a-b)x - \frac{1}{a+b} \sin(a+b)x \right] + c, \quad a \neq b$$

$$\int \cos ax \cos bx dx = \frac{1}{2} \left[\frac{1}{b-a} \sin(a-b)x + \frac{1}{a+b} \sin(a+b)x \right] + c, \quad a \neq b$$

$$\int e^{ax} dx = \frac{1}{a} e^{ax} + c, \quad a \neq 0$$

$$\int a^x dx = \frac{1}{\ln a} a^x + c, \quad a \neq 1, a > 0$$

$$\int \frac{1}{u} dx = \ln |u| + c, \quad u > 0$$

$$\int \frac{1}{u \pm a} dx = \ln |u \pm a| + c$$

$$\int \frac{1}{u^2 - a^2} du = \frac{1}{2a} \ln \left| \frac{u-a}{u+a} \right| + c$$

$$\int \frac{1}{a^2 - u^2} du = \frac{1}{2a} \ln \left| \frac{u+a}{a-u} \right| + c$$

$$\int \frac{1}{\sqrt{a^2 - u^2}} du = \sin^{-1} \left(\frac{u}{a} \right) + c$$

$$\int \frac{1}{u^2 + a^2} du = \frac{1}{a} \tan^{-1} \left(\frac{u}{a} \right) + c$$

$$\int \sec x dx = \ln |\sec x + \tan x| + c; \quad \left(\sec x = \frac{1}{\cos x} \right)$$

$$\int \csc x dx = \ln |\csc x - \cot x| + c; \quad \left(\csc x = \frac{1}{\sin x} \right)$$

$$\int \sec ax dx = \frac{1}{a} \ln |\sec ax + \tan ax| + c; \quad \left(\sec x = \frac{1}{\cos x} \right)$$

$$\int \csc ax dx = \frac{1}{a} \ln |\csc ax - \cot ax| + c; \quad \left(\csc x = \frac{1}{\sin x} \right)$$

$$\int (f(x))^r f'(x) dx = \frac{(f(x))^{r+1}}{r+1}$$

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

$$\int \frac{dx}{x \ln x} = \ln(\ln x)$$

$$\int u dv = uv - \int v du \quad \text{جزء به جزء}$$

ادامه دارد ...



$$f(x) = c \Rightarrow f'(x) = 0, \quad c = \text{Const}$$

$$f(x) = ax + b \Rightarrow f'(x) = a, \quad a, b = \text{Const}$$

$$f(x) = ax^n \Rightarrow f'(x) = nax^{n-1}, \quad a = \text{Const}$$

$$y = \sqrt[m]{x^n} \Rightarrow y' = \frac{n}{m\sqrt[m]{x^{m-n}}}$$

$$y = \sqrt[m]{f(x)^n} \Rightarrow y' = \frac{nf'(x)}{m\sqrt[m]{f(x)^{m-n}}}$$

$$y = |x| \Rightarrow y' = \frac{x}{|x|}$$

$$y = |f(x)| \Rightarrow y' = \frac{f(x)f'(x)}{|f(x)|}$$

$$y = kf(x) \Rightarrow y' = kf'(x), \quad k = \text{Const}$$

$$y = f(x) \pm g(x) \Rightarrow y' = f'(x) \pm g'(x)$$

$$y = f(x).g(x) \Rightarrow y' = f'(x).g(x) + g'(x).f(x)$$

$$y = \frac{f(x)}{g(x)} \Rightarrow y' = \frac{f'(x).g(x) - g'(x).f(x)}{(g(x))^2}$$

$$f(x) = \sin x \Rightarrow f'(x) = \cos x$$

$$f(x) = \cos x \Rightarrow f'(x) = -\sin x$$

$$f(x) = \tan x \Rightarrow f'(x) = 1 + \tan^2 x = \frac{1}{\cos^2 x} = \sec^2 x$$

$$f(x) = \cot g x \Rightarrow f'(x) = -(1 + \cot^2 g^2 x) = -\frac{1}{\sin^2 x} = -\text{cosec}^2 x$$

$$f(x) = \sin u(x) \Rightarrow f'(x) = u'(x) \cos u(x)$$

$$f(x) = \cos u(x) \Rightarrow f'(x) = -u'(x) \sin u(x)$$

$$f(x) = \tan u(x) \Rightarrow f'(x) = u'(x)(1 + \tan^2 u(x)) = \frac{u'(x)}{\cos^2 u(x)}$$

$$f(x) = \cot g u(x) \Rightarrow f'(x) = -u'(x)(1 + \cot^2 g^2 u(x)) = -\frac{u'(x)}{\sin^2 u(x)}$$

$$y = \sin^n u(x) \Rightarrow y' = nu'(x) \cos u(x) \cdot \sin^{n-1} u(x)$$

$$y = \cos^n u(x) \Rightarrow y' = -nu'(x) \sin u(x) \cdot \cos^{n-1} u(x)$$

$$y = \text{tg}^n u(x) \Rightarrow y' = nu'(x) (1 + \text{tg}^2 u(x)) \cdot \text{tg}^{n-1} u(x)$$

$$y = \text{cotg}^n u(x) \Rightarrow y' = -nu'(x) (1 + \text{cotg}^2 u(x)) \cdot \text{cotg}^{n-1} u(x)$$

$$y = \sec u(x) \Rightarrow y' = u'(x) \sec u(x) \cdot \text{tg} u(x)$$

$$y = \text{cosec} u(x) \Rightarrow y' = -u'(x) \text{cosec} u(x) \cdot \text{cotg} u(x)$$

$$y = au^n \Rightarrow y' = nau'u^{n-1}$$

$$y = a^{u(x)} \Rightarrow y' = u'(x)a^{u(x)} \ln a$$

$$y = \log_a^{u(x)} \Rightarrow y' = \frac{u'(x)}{u(x) \ln a}$$

$$y = \ln u(x) \Rightarrow y' = \frac{u'(x)}{u(x)}$$

$$y = e^{u(x)} \Rightarrow y' = u'(x)e^{u(x)}$$

$$y = u(x)^{v(x)} \Rightarrow y' = u(x)^{v(x)} \left[v'(x) \ln u(x) + \frac{u'(x)}{u(x)} \cdot v(x) \right]$$

$$y = \text{Arc sin } u(x) \Rightarrow y' = \frac{u'(x)}{\sqrt{1-u^2(x)}}$$

$$y = \text{Arc cos } u(x) \Rightarrow y' = \frac{-u'(x)}{\sqrt{1-u^2(x)}}$$

$$y = \text{Arctg } u(x) \Rightarrow y' = \frac{u'(x)}{1+u^2(x)}$$

$$y = \text{Arc cotg } u(x) \Rightarrow y' = \frac{-u'(x)}{1+u^2(x)}$$

$$y = \text{Arc secu } (x) \Rightarrow y' = \frac{u'(x)}{u(x)\sqrt{u^2(x)-1}}$$

$$y = \text{Arc cosec } u(x) \Rightarrow y' = \frac{-u'(x)}{u(x)\sqrt{u^2(x)-1}}$$

