Derivace:

$(e^x)' = e^x$

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

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

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

$\sin x' = \cos x$

$\cos x' = -\sin x$

$\mathrm{tg}\, x' = \frac{1}{\cos^2 x}$

$\mathrm{cotg}\, x' = \frac{-1}{\sin^2 x}$

$\arcsin x' = \frac{1}{\sqrt{1-x^2}}$

$\arccos x' = \frac{-1}{\sqrt{1-x^2}}$

$\mathrm{arctg}\, x' = \frac{1}{x^2+1}$

Ez integrály:

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

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

$\int \sin x \, dx = -\cos x + c$

$\int \cos x \, dx = \sin x + c$

$\int \frac{1}{1+x^2} \, dx = \mathrm{arctg}\, x + c$

$\int e^x = e^x \quad \int \mathrm{tg}\, x \, dx = -\ln(\cos x)$

Per partes:

$\int u(x) \cdot v'(x) = u(x) v(x) - \int u'(x) \cdot v(x) \, dx$

Substituce:

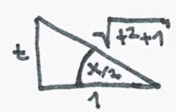
$\int f(g(x)) \cdot g'(x) \, dx = \int f(t) \, dt = F(g(x)) + c$

Univerzální goniometrická:

$t = \mathrm{tg}\frac{x}{2}$ $\quad \sin\frac{x}{2} = \frac{t}{\sqrt{1+t^2}}$ $\quad \cos\frac{x}{2} = \frac{1}{\sqrt{1+t^2}}$

$\mathrm{arctg}\, t = \frac{x}{2}$ $\quad \sin x = \frac{2t}{1+t^2}$ $\quad \cos x = \frac{1-t^2}{1+t^2}$

$dx = \frac{2}{1+t^2}$



nebo x

Parciální zlomky: $\frac{P_n(x)}{Q_m(x)}$

1) $n < m$

2) jmenovatel na součin

3) $\frac{A_n}{(x-a)^k}$ nebo $\frac{A_{n-1}x + A_n}{ax^2+bx+c}$

Subst. ve fcích se sin a cos:

lichá v sinu $\Rightarrow$ $t = \cos x$ $\quad$ lichá v cosinu $\Rightarrow$ $t = \sin x$

sudá v sinu i cosinu $\Rightarrow$ $t = \mathrm{tg}\, x$

Objem rotačního tělesa: $V = \pi \int_a^b [f(x)]^2 \, dx$

Délka křivky: $L = \int_a^b \sqrt{1 + [f'(x)]^2} \, dx$

$s = \int_{t_1}^{t_2} \sqrt{[x'(t)]^2 + [y'(t)]^2} \, dx$

Odmocniny:

různé odm. se stejným výrazem: výraz = $t^{NSN\, ap.}$

$\int \frac{\sqrt[3]{x}}{x+\sqrt{x}} \, dx \quad \left| \begin{matrix} x = t^6 \\ dx = 6t^5 dt \end{matrix} \right|$

Kvadratický dvojčlen

$\sqrt{x^2-1} = x + t$ a umocnit obě strany

cosi:

$\int \sqrt{a^2-x^2} \, dx \quad \left| \begin{matrix} x = a \cdot \sin t \\ dx = a \cdot \cos t \, dt \end{matrix} \right| \rightarrow \int \cos^2 t = \frac{1}{2}\int (\cos 2t + 1) = \frac{1}{4}\sin 2t + \frac{1}{2}t$

$\int \ln x \quad \left| \begin{matrix} u = \ln x \\ v' = 1 \end{matrix} \right|$ $\qquad \int \frac{1}{x} \ln x \quad \left| \begin{matrix} u = \ln x \\ v' = 1/x \end{matrix} \right|$

$\int f(x) \cdot f'(x) = \frac{[f(x)]^2}{2} + c$ $\qquad \int \frac{f'(x)}{f(x)} = \ln|f(x)| + c$

$\int e^x \cdot \sin x \quad \left| \begin{matrix} u = \sin x \\ v' = e^x \end{matrix} \right|$ $\qquad \int \frac{1}{x \cdot \sqrt{\ln x}} \quad |t = \ln x|$

$\int \ln(x + \sqrt{1+x^2}) \quad \left| \begin{matrix} u = \ln(\cdots) \\ v' = 1 \end{matrix} \right|$

$\int \frac{\ln(\mathrm{tg}\, x)}{\sin x \cos x} \quad \left| \begin{matrix} t = \ln(\mathrm{tg}\, x) \\ dt = \frac{dx}{\sin x \cos x} \end{matrix} \right|$ $\qquad \int \frac{1}{x^2+a^2} = \frac{1}{a} \mathrm{arctg}\frac{x}{a} + c$

$\int \frac{\sin x \cdot \cos x}{\sqrt{a - \sin^2 x}} \quad |t^2 = a - \sin^2 x|$

$\int \frac{e^{2x}}{\sqrt[4]{e^x+1}} \quad |e^x + 1 = t^4|$

$\int \frac{1}{\sin x} \, dx = \ln\left|\mathrm{tg}\frac{x}{2}\right|$

Random věci:

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

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

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

$\sin x = \cos(x - \frac{\pi}{2})$

Rovnice tečny: $y - y_0 = k(x - x_0)$

Asymptoty:

$a = \lim_{x \to \pm\infty} \frac{f(x)}{x} \qquad b = \lim_{x \to \pm\infty} [f(x) - ax]$

Taylorův pol.: $T_{(x)} = f(x_0) + \frac{f'(x_0)}{1}(x - x_0) + \dots + \frac{f^{(n)}(x_0)}{n!}(x - x_0)^n$

chyba: $f(x) = T_n(x) + R_{n+1}^{(x)} \rightarrow \frac{f^{(n+1)}(c)}{(n+1)!}(x - x_0)^{n+1}$ největší hodnota (kterou $f^{(n+1)}$ nabývá na $(0,1)$)

Limita: A je limitou $f(x)$, když v bodě c

$\forall \varepsilon > 0 \; \exists \delta > 0: \; 0 < |x - c| < \delta \Rightarrow |f(x) - A| < \varepsilon$