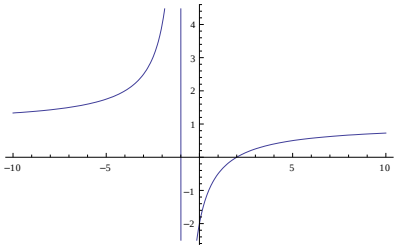
$$u = 1 + x^2 \;;\; du = 2xdx\ (odvod\ u) => xdx = \frac{du}{2}$$
$$\int \frac{1}{1+x^2}dx = \int \frac{1}{U} * \frac{du}{2} = \frac{1}{2}\int \frac{du}{u} =$$
$$\frac{1}{2}logu + C = \frac{1}{2}\log(1+x^2) + C$$

$$\lim_{x\to\infty}\left(\frac{x+5}{x+3}\right)^{4x} = \lim_{x\to\infty}\left(\frac{x+3+2}{x+3}\right)^{4x} = \lim_{x\to\infty}\left(1+\frac{2}{x+3}\right)^{4x}$$
$$=$$
$$\lim_{x\to\infty}\left(1+\frac{1}{\frac{x}{2}+\frac{3}{2}}\right)^{4x} = \lim_{x\to\infty}((1+\frac{1}{\frac{x}{2}+\frac{3}{2}})^{\frac{x}{2}})^8 = e^8$$

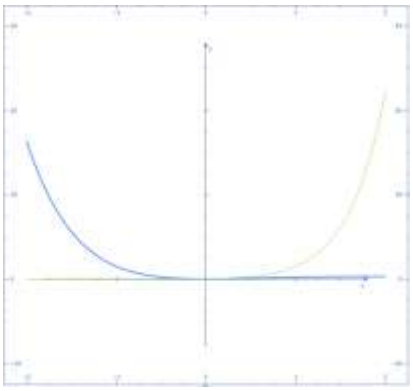
$$x^2 * e^{x-1} \to 2e^{-1+x} + e^{-1+x}x^2$$
$$x * e^{-x} \to e^{-x} - e^{-x}x$$
$$x * e^{-x^2} \to e^{-x^2} - 2e^{-x^2}x^2$$
$$x * e^{2x-1} \to e^{-1+2x} + 2e^{-1+2x}x$$
$$x^2 * e^{-x} \to 2e^{-x}x - e^{-x}x^2$$

$$\lim_{x\to0}\frac{\sin x}{x} = 1$$
$$\lim_{x\to0}\frac{\sin 4x}{\sqrt{x+1}-1} = \lim_{x\to0}\frac{(\sqrt{x-1}+1)\sin 4x}{(\sqrt{x+1}-1)(\sqrt{x-1}+1)} =$$
$$\lim_{x\to0}\frac{(\sqrt{x-1}+1)\sin 4x}{x+1-1} = \lim_{x\to0}\frac{(\sqrt{x-1}+1)\sin 4x}{x} * \left(\frac{1}{4}*\frac{4}{1}\right) =$$
$$\lim_{x\to0}\frac{(\sqrt{x-1}+1)\sin 4x}{4x} * \frac{4}{1} = 4\lim_{x\to o}\frac{(\sqrt{x-1}+1)\sin 4x}{4x} =$$
$$4\lim_{x\to0}(\sqrt{x-1}+1) = 4*2 = 8$$

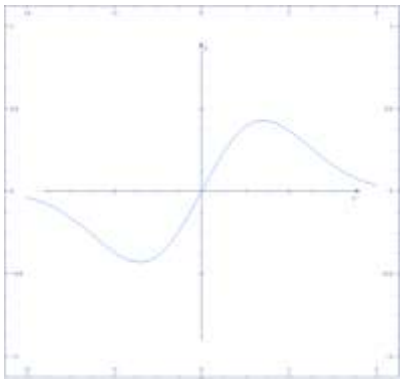
$$\int cos^3x = \int \cos x * cos^2x = \int \cos x\,(1 - sin^2x) =$$
$$\int (\cos x - \cos x\ sin^2x) = \int \cos x\,dx - \int \cos x\, sin^2x dx =$$
$$\sin x - \int \cos x\, u^2 \frac{du}{\cos x} = \sin x - \int u^2 du = \sin x - \frac{sin^3x}{3}$$
$$u = \sin x \;;\; du = \cos x\,dx \to dx = \frac{du}{\cos x}$$



Slika 3 - (x-2)/(x+1)



2 : x^2e^(-x) ; gor : x*e^(2x-1)
x*e^(-x) – prezrcaljena modra čez X-os
gor tudi x^2*e^(x-1)



1: x*e^(-x^2)

Kompleksna števila

$(a+bI) \mp (c+dI) = (a \mp c) + (b \mp d)I$

$(a+bI) * (c+dI) = (ac-bd) + (ad+bc)I$

$I^1 = I\ ;\ I^2 = -1; I^3 = -I; I^4 = 1$

$z = a + bI\ ; w = c + dI$

$\bar{z} = a - bI - konjugirano\ število$

$|z| = |\bar{z}| = \sqrt{a^2+b^2} - \ absolutna\ vrednost$

$\frac{z}{w} = \frac{z\bar{w}}{w\bar{w}} = \frac{z * \bar{w}}{c^2+d^2}$

$z^{\frac{x}{y}} = \frac{1}{y}(a+bI)^x$

Polarni zapis:

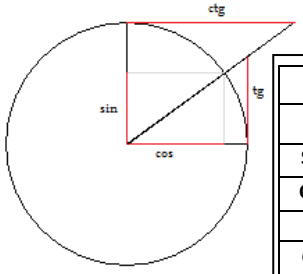
$z = r(cos\varphi + Isin\varphi) - \ trigeometrični\ zapis$

$z = r * e^{I\varphi} - \ ekspotencjalni\ zapis$

$r = |z|$

$$\varphi = \begin{cases} arc\tan\left(\frac{b}{a}\right); a > 0 \\ arc\tan\left(\frac{b}{a}\right) + \pi; a < 0\ \wedge b \geq 0 \\ arc\tan\left(\frac{b}{a}\right) - \pi\ ; a < 0\ \wedge b < 0 \\ +\frac{\pi}{2}\ ; a = 0 \wedge y > 0 \\ +\frac{\pi}{2}\ ; a = 0 \wedge y < 0 \end{cases}$$

$|z+w| \leq |z| + |w|\ \ ;\ \ |z*w| = |z| * |w|$



	0	30	45	60	90	180	270	360
	0π	π/6	π/4	π/3	π/2	π	3 π/2	2 π
Sin	0	½	$\sqrt{2}/2$	$\sqrt{3}/2$	1	0	-1	0
Cos	1	$\sqrt{3}/2$	$\sqrt{2}/2$	½	0	-1	0	1
Tg	0	$\sqrt{3}/3$	1	$\sqrt{3}$	$\mp\infty$	0	$\mp\infty$	0
ctg	$\mp\infty$	$\sqrt{3}$	1	$\sqrt{3}/3$	0	$\mp\infty$	0	$\mp\infty$

$sin^2\alpha + cos^2\alpha = 1\ ; tg\alpha = \frac{sin\alpha}{cos\alpha}$

Če $f'(x) = 0$:
minimum: $f''(x) > 0$
maksimum: $f''(x) < 0$

Limite:

$\lim_{x\to x0}[f(x) \pm/* g(X)] = \lim_{x\to x0} f(x) \pm/* \lim_{x\to x0} g(x)$

$\lim_{x\to x0}[c * f(x)] = c * \lim_{x\to x0} f(x)$

$\lim_{x\to x0}[\log f(x)] = \log\left[\lim_{x\to x0} f(x)\right]\ ;\ \lim_{x\to x0}\sqrt{f(x)} = \sqrt{\lim_{x\to x0} f(x)}$

$\lim_{x\to x0}[f(x)]^n = \left[\lim_{x\to x0} f(x)\right]^n\ \ ;\ \ \lim_{x\to x0} g(f(x)) = g\left(\lim_{x\to x0} f(x)\right)$

$\lim_{x\to x0} c^{f(x)} = c^{\lim_{x\to x0} f(x)}$

Odvod:

$f'(x) = \lim_{\Delta x\to 0}\frac{f(f+\Delta x)-f(x)}{\Delta x} = \lim_{\Delta x\to 0}\frac{\Delta y}{\Delta x} = \frac{dy}{dx} = \lim_{\Delta x\to 0} tg\beta = tg\alpha$

Funkcija	Odvod
$y = C\ ; C - konstanta$	$y' = 0$
$y = f(x) \pm g(x) \pm h(x)$	$y' = f'(x) \pm g'(x) \pm h'(x)$
$y = C * f(x)$	$y' = c * f'(x)$
$y = f(x) * g(x)$	$y' = f'(x) * g(x) + f(x) * g'(x)$
$y = \frac{f(x)}{g(x)}$	$y' = \frac{f'(x) * g(x) - f(x) * g'(x)}{(g(x))^2}$
$y = f[g(x)]$	$y' = f'[g(x)] * g'(x)$

Osnovni odvodi:

func	odvod
C (konst)	0
x	1
Cx	C
$\frac{1}{x}$	$-\frac{1}{x^2}$
$\frac{1}{x^n}$	$-\frac{n}{x^{n+1}}$
a^x	$a^x * lna$
e^x	e^x
$sinx$	$\cos x$
$cosx$	$-sinx$
tgx	$\frac{1}{cos^2 x}$
$ctgx$	$-\frac{1}{sin^2 x}$

func	Odvod
x^n	$n * x^{n-1}$
$a * x^n$	$an * x^{n-1}$
$\sqrt{x}$	$\frac{1}{2\sqrt{x}}$
$\sqrt[n]{x}$	$\frac{1}{n\sqrt[n]{x^{n-1}}}$
lnx	$\frac{1}{x}$
$log_a x$	$\frac{1}{x * lna}$
$arc\sin x$	$\frac{1}{\sqrt{1-x^2}}$
$arc\cos x$	$-\frac{1}{\sqrt{1-x^2}}$
$arc\ tg\ x$	$\frac{1}{1-x^2}$
$arc\ ctg\ x$	$-\frac{1}{\frac{1}{1-x^2}}$

Pravila integriranja:

$\int f(x)dx = F(x) + C$

$\int C * f(x)dx = C\int f(x)dx$

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

Osnovni integrali:

$\int dx = x + C$	$\int e^x dx = e^x + C$
$\int x^n dx = \frac{x^{n+1}}{n+1} + C$	$\int e^{n*x} dx = \frac{e^{n*x}}{n} + C$
$\int \frac{1}{x} dx = \ln\lvert x\rvert + C$	$\int a^x dx = \frac{a^x}{lna} + C$
$\int sinxdx = -cosx + C$	$\int tgxdx = -\ln\lvert cosx\rvert + C$
$\int cosxdx = sinx + C$	$\int ctgxdx = \ln\lvert\sin x\rvert + C$

Ostalo:

$(a \pm b)^2 = a^2 \pm 2ab + b^2$

$(a \pm b)^3 = a^3 \pm 3a^2b + 3ab^2 \pm b^3$

$a^{-n} = \frac{1}{a^n}\ ;\ \sqrt[n]{a^m} = a^{\frac{m}{n}}$

$log\ a^n = n * \log a\ ; \log\sqrt{a} = \frac{1}{2}\log a$

$x_{1,2} = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

Določen integral:

$\int_a^b f(x)dx = F(x)\Big|_a^b = F(b) - F(a)$

$\int_a^b f(x)dx = -\int_b^a f(x)dx$

$\int_a^b [f(x) \pm g(x)] = \int_a^b f(x)dx \pm \int_a^b g(x)dx$

Zaporedje člen:

$|1 - an| < \varepsilon$

an – formula zaporedja

Tangenta na krivuljo v točki $(x_0, f(x_0))$:

$y - f(x_0) = f'(x_0)(x - x_0)$

Iz polarne v normalno (kompleksna):

$a = r * \cos\varphi\ \ ;\ \ b = r * \sin\varphi$