Calculus

H3 Afgeleiden

Basics

$D(x^n) = nx^{n-1}dx$
$D(f(x)+g(x)) = D(f(x)) + D(g(x))$
$D(\lambda f(x)) = \lambda D(f(x))$
$d(f \cdot g)(x) = f(x)g'(x) + f'(x)g(x)$
$d\left(\frac{f(x)}{g(x)}\right) = \frac{g(x)f'(x) - g'(x)f(x)}{(g(x))^2}$

Goniometrische functies

$D(\sin x) = \cos x$
$D(\cos x) = -\sin x$
$D(\tan x) = \frac{1}{\cos^2 x}$
$D(\cot x) = \frac{-1}{\sin^2 x}$
$D(\sec x) = \frac{\sin x}{\cos^2 x}$
$D(\csc x) = \frac{-\cos x}{\sin^2 x}$

Cyclometrische functies

$D(\text{Bgsin}\, x) = \frac{1}{\sqrt{1-x^2}}$
$D(\text{Bgcos}\, x) = \frac{-1}{\sqrt{1-x^2}}$
$D(\text{Bgtan}\, x) = \frac{1}{1+x^2}$
$D(\text{Bgcot}\, x) = \frac{-1}{1+x^2}$

Hyperbolische functies

$D(\sinh x) = \cosh x$
$D(\cosh x) = \sinh x$
$D(\tanh x) = \frac{1}{\cosh^2 x}$
$D(\coth x) = \frac{-1}{\sinh^2 x}$

Exponentiële functies

$D(a^x) = a^x \ln a$
$D(e^x) = e^x$
$D(\ln x) = \frac{1}{x}$
$D(\log_a x) = \frac{1}{x \ln a}$

Kettingregel

$D(f(g(x))) = f'(g(x))g'(x)$

H4 Integralen

Basics

$\int x^n dx = \frac{x^{n+1}}{n+1} + C$
$\int f(x) + g(x) dx = \int f(x)dx + \int g(x)dx$
$\int \lambda f(x)dx = \lambda \int f(x)dx$
$\int f(x)g'(x)dx = f(x)g(x) - \int f'(x)g(x)dx$
$\int \frac{f'(x)}{f(x)}dx = \ln|f(x)| + C$

Goniometrische functies

$\int \sin x dx = -\cos x + C$
$\int \cos x dx = \sin x + C$
$\int \frac{1}{\cos^2 x}dx = \tan x + C$
$\int \frac{-1}{\sin^2 x}dx = \cot x + C$

Cyclometrische functies

$\int \frac{1}{\sqrt{1-x^2}}dx = \text{Bgsin}\, x + C$
$\int \frac{1}{\sqrt{a^2-x^2}}dx = \text{Bgsin}\, \frac{x}{a} + C$
$\int \frac{1}{x^2+1}dx = \text{Bgtan}\, x + C$
$\int \frac{1}{\sqrt{x^2+a}}dx = \ln|x + \sqrt{x^2+a}| + C$

Hyperbolische functies

$\int \cosh x dx = \sinh x + C$
$\int \sinh x dx = \cosh x + C$
$\int \frac{1}{\cosh^2 x}dx = \tanh x + C$
$\int \frac{1}{\sinh^2 x}dx = -\coth x + C$

Exponentiële functies

$\int a^x dx = \frac{a^x}{\ln a} + C$
$\int e^x dx = e^x + C$
$\int \frac{1}{x}dx = \ln|x| + C$

H5 Bepaalde integralen

Oppervlakte

Cartesisch	$S = \int_a^b \lVert f(x) \rVert dx$
Parameter	$S = \int_a^b \lVert g(t) \rVert f'(t)dt$
Pool	$S = \int_\alpha^\beta (r(\theta))^2 d\theta$

Omwentelingsvolume

Cartesisch	$V = \pi \int_a^b (f(x))^2 dx$
Parameter	$V = \pi \int_a^b (g(t))^2 f'(t)dt$
Pool	

Booglengte

Cartesisch	$L = \int_a^b \sqrt{1 + (f'(x))^2}dx$
Parameter	$L = \int_a^b \sqrt{(f'(t))^2 + (g'(t))^2}dt$
Pool	$L = \int_\alpha^\beta \sqrt{(r(\theta))^2 + (r'(\theta))^2}d\theta$

Complanatie

Cartesisch	$C = 2\pi \int_a^b \lVert f(x) \rVert \sqrt{1 + (f'(x))^2}dx$
Parameter	$C = 2\pi \int_a^b \lVert g(t) \rVert \sqrt{(f'(t))^2 + (g'(t))^2}dt$
Pool	