Calculus

H3 Afgeleiden

Basics

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

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

$$D(\operatorname{Bgsin} x) = \frac{1}{\sqrt{1 - x^2}}$$

$$D(\operatorname{Bgcos} x) = \frac{1}{\sqrt{1 - x^2}}$$

$$D(\operatorname{Bgtan} x) = \frac{1}{1 + x^2}$$

$$D(\operatorname{Bgcot} x) = \frac{-1}{1 + x^2}$$

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

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

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

$$\int \frac{1}{\sqrt{1-x^2}} dx = \operatorname{Bgsin} x + C$$

$$\int \frac{1}{\sqrt{a^2 - x^2}} dx = \operatorname{Bgsin} \frac{x}{a} + C$$

$$\int \frac{1}{x^2 + 1} dx = \operatorname{Bgtan} x + C$$

$$\int \frac{1}{\sqrt{x^2 + a}} dx = \ln|x + \sqrt{x^2 + a}| + C$$

Hyperbolische functies

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

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	$S = \int_{a}^{b} f(x) dx$
Parameter	$S = \int_a^b \ g(t)\ f'(t)dt$
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	$L = \int_{0}^{\beta} \sqrt{(r(\theta))^2 + (r'(\theta))^2} d\theta$

Complanatie

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