MATEMATIK
Chalmers

Matematisk analys i en variabel I, MVE015, 5p.

Formelblad

Trigonometriska formler

$\cos(x+y) = \cos x \cdot \cos y - \sin x \cdot \sin y$ $\sin(x+y) = \sin x \cdot \cos y + \cos x \cdot \sin y$ $\tan(x+y) = \dfrac{\tan x + \tan y}{1 - \tan x \cdot \tan y}$

$\cos x \cdot \cos y = \frac{1}{2}(\cos(x+y) + \cos(x-y))$ $\sin x \cdot \cos y = \frac{1}{2}(\sin(x+y) + \sin(x-y))$ $\cos^2 x = \frac{1}{2}(1 + \cos 2x)$

$\sin x \cdot \sin y = \frac{1}{2}(\cos(x-y) - \cos(x+y))$ $\sin^2 x = \frac{1}{2}(1 - \cos 2x)$

Maclaurinserier

$$e^x = \sum_{k=0}^{\infty} \frac{x^k}{k!} = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \cdots + \frac{x^k}{k!} + \cdots \quad \text{för alla } x$$

$$\cos x = \sum_{k=0}^{\infty} \frac{(-1)^k x^{2k}}{2k!} = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} + \cdots + (-1)^k \frac{x^{2k}}{(2k)!} + \cdots \quad \text{för alla } x$$

$$\sin x = \sum_{k=0}^{\infty} \frac{(-1)^k x^{2k+1}}{(2k+1)!} = \frac{x^1}{1!} - \frac{x^3}{3!} + \cdots + (-1)^k \frac{x^{2k+1}}{(2k+1)!} + \cdots \quad \text{för alla } x$$

$$\ln(1+x) = \sum_{k=0}^{\infty} (-1)^k \frac{x^{k+1}}{k+1} = x - \frac{x^2}{2} + \frac{x^3}{3} + \cdots + (-1)^k \frac{x^k}{k} + \cdots \quad \text{när } |x| < 1$$

$$\arctan x = \sum_{k=0}^{\infty} (-1)^k \frac{x^{2k+1}}{2k+1} = x - \frac{x^3}{3} + \frac{x^5}{5} + \cdots + (-1)^k \frac{x^{2k}+1}{2k+1} + \cdots \quad \text{när } |x| < 1$$

$$(1+x)^\alpha = \sum_{k=0}^{\infty} \binom{\alpha}{k} x^k = 1 + \alpha x + \binom{\alpha}{2} x^2 + \cdots + \binom{\alpha}{k} x^k + \cdots \quad \text{när } |x| < 1$$

Lapalcetransformen

Räkneregler

$f(t)$	$\tilde{f}(s)$
$f'(t)$	$s\tilde{f}(s) - f(0)$
$f^{(n)}(t)$	$s^n \tilde{f}(s) - s^{n-1} f(0) - s^{n-2} f'(0) - \cdots - s f^{n-2}(0) - f^{n-1}(0)$
$t^n f(t)$	$(-1)^n \tilde{f}^{(n)}(s)$
$(f * g)(t)$	$\tilde{f}(s)\tilde{g}(s)$
$f(t+p) = f(t)$ för alla t	$\dfrac{1}{1 - e^{-ps}} \displaystyle\int_0^p f(t) e^{-st}\, dt$
$u(t-a)f(t-a)$ där $a > 0$	$e^{-as}\tilde{f}(s)$
$e^{at} f(t)$	$\tilde{f}(s-a)$

Transformer

$f(t)$	$\tilde{f}(s)$
1	$\dfrac{1}{s}$
t^n	$\dfrac{n!}{s^{n+1}}$
e^{at}	$\dfrac{1}{s-a}$
$\cos bt$	$\dfrac{s}{s^2+b^2}$
$\sin bt$	$\dfrac{b}{s^2+b^2}$