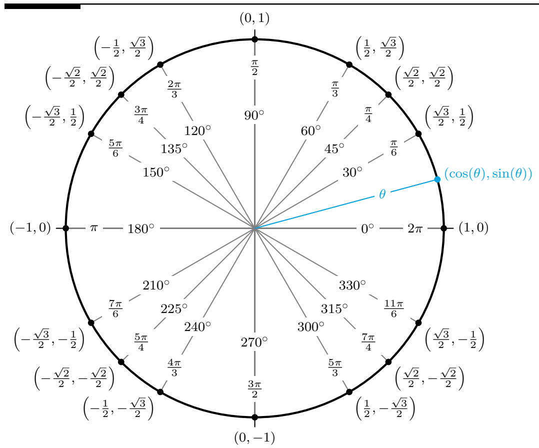
Analysis

Trigonometrie



Integrale

Standardintegrale

Sinus

$$\int \sin x \cdot \cos x \, dx = \frac{1}{2} \cdot \sin^2 x + c \tag{1}$$

$$\int \sinh x \, dx = \cosh x + c \tag{2}$$

Cosinus

$$\int \cosh x \, dx = \sinh x + c \tag{3}$$

$$\int \cot x \, dx = \frac{1}{\tan x} + c = \ln|\sin x| + c = \frac{\cos x}{\sin x} + c \tag{4}$$

$$\int \coth x \, dx = \frac{\cosh x}{\sinh x} + c \tag{5}$$

Tangents

$$\int \tan x \, dx = \frac{1}{\cot x} + c = -\ln|\cos x| + c = \frac{\sin x}{\cos x} + c \tag{6}$$

$$\int \tanh x \, dx = \frac{\sinh x}{\cosh x} + c \tag{7}$$

Add these derrivatives somewhere usefull

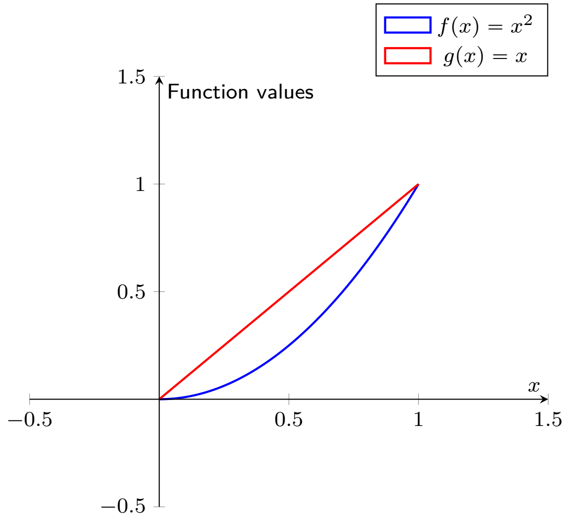
$$\frac{d}{dx} \tan x = 1 + \tan^2 x \tag{8}$$

$$\frac{d}{dx} \cot x = -1 - \cot^2 x \tag{9}$$

Integralfläche berechnen (analytisch)

$$A = \int_a^b |f(x) - g(x)| \, dx \tag{10}$$

Scale Plot and make a better example



Trapezformel (Numerisch)

$S_1 = y_1 + y_n \qquad S_2 = y_1 + y_2 + \cdots + y_{n-1}$

$$\frac{1}{2} \cdot h \cdot S_1 + h \cdot S_2 \tag{11}$$

1. Stützstellen bestimmen und ausrechnen
2. Mit Taschenrechner alle Stützstellen mittels Formel 11 berechnen

Substitution

Normale Substitution

$$\int_a^b f(g(x))dx \quad | \quad u(x) = g(x) \quad | \quad u'(x) = g'(x) \quad | \quad du = u'(x) \cdot dx$$

$$\int_{u(a)}^{u(b)} u(x) \frac{1}{u'(x)} \, du \quad | \quad dx = \frac{1}{u'(x)} \, du \tag{12}$$

Wenn nach einer Substitution noch ein x in der Gleichung vorhanden ist, muss dieses in ein u umgewandelt werden.

$$\int \frac{e^{2x}}{1+e^2} \, dx \quad | \quad u = 1 + e^x \quad | \quad u' = e^x \quad | \quad du = e^x \, dx \Leftrightarrow du = \frac{1}{e^x}$$

$$\int \frac{e^{2x}}{u} \cdot \frac{1}{e^x} \, du = \int \frac{e^x}{u} \, du \quad | \quad u = 1 + e^x \Leftrightarrow e^x = u - 1$$

$$\int \frac{u-1}{u} \, du = \int \frac{u}{u} - \frac{1}{u} \, du = \int 1 - \frac{1}{u} \, du = \underline{\underline{u - \ln|u| + c}}$$

Umgekehrte Substitution (Example)

$$\int_0^1 \sqrt{1 - x^2} \, dx \quad | \quad x = \sin u \quad | \quad x' = \cos u$$

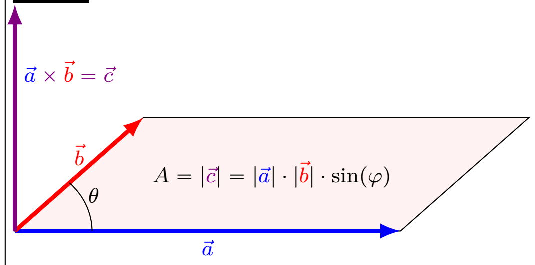
$$\int_0^{\frac{\pi}{2}} \sqrt{1 - \sin^2 u} \cdot \cos u \, du \quad | \quad dx = \cos u \, du \Leftrightarrow du = \frac{1}{\cos u} \, dx$$

$$\int_0^{\frac{\pi}{2}} \cos^2 u \, du \quad = \quad \left[\frac{u}{2} + \frac{\sin 2u}{4}\right]_0^{\pi/2} = \frac{\pi}{4} + 0 = \frac{\pi}{4}$$

Flächen-Integrale

Lineare Algebra

Vektoranalysis



Variabletabbele

Übungsaufgaben