

5. INTEGROINTI

5.6 INTEGROINTI SJOITTAMALLA

5.6.4 Trigonometrisia integraaleja

Esimerkki.

$$\int_0^{\pi/2} \sin^2(x) \cos(x) dx.$$

Sijoitetaan

$$u = \sin(x) = g(x), \quad du = g'(x)dx = \cos(x)dx.$$

Rajoiksi saadaan

$$x = 0 \rightarrow u = g(0) = \sin(0) = 0, \quad x = \frac{\pi}{2} \rightarrow u = g(\pi/2) = \sin(\pi/2) = 1.$$

Siis

$$\int_0^{\pi/2} \sin^2(x) \cos(x) dx = \int_0^1 u^2 du = \left| \frac{u^3}{3} \right|_0^1 = \frac{1}{3} - 0 = \frac{1}{3}.$$

Esimerkki.

$$\begin{aligned} \int \tan(x) dx &= \int \frac{\sin(x)}{\cos(x)} dx = - \int \frac{1}{\cos(x)} (-\sin(x)) dx \\ &= - \int \frac{1}{u} du = -\ln |u| + C = -\ln |\cos(x)| + C. \end{aligned}$$

VIITTEET

- [1] R. A. Adams and C. Essex, *Calculus: a complete course*, Ninth edition, Pearson, Ontario, 2018. Sivut 305–306.