2.4. Sini- ja kosmifunktio

2.5. Eksponenttifunktio

$$\int \sin x \, dx = -\cos x + C$$

$$\int \cos x \, dx = \sin x + C$$

$$\int e^x \, dx = e^x + C$$

$$\int a^x \, dx = \frac{a^x}{\ln a} + C$$

Esim.

a) $\frac{1}{2}\int 2 \cdot \sin(2x)\,dx$

$= -\frac{1}{2}\cos(2x) + C$

b) $\frac{1}{2}\int 2x e^{x^2} dx$

$s(x) = x^2 \rightarrow s' = 2x$

$u(x) = e^x$

$= \frac{1}{2} e^{x^2} + C$

257. a) $\int \cos^2 x \, dx = \int (\cos x)^2 \, dx$

ei onnistu valitsemalla

$s(x) = \cos x \rightarrow s' = -\sin x$

$u(x) = x^2$

MAOL

$= \int \frac{1}{2}(1 + \cos 2x) \, dx$

$= \int \frac{1}{2} \, dx + \frac{1}{2} \cdot \frac{1}{2} \int 2 \cdot \cos 2x \, dx$

$= \frac{1}{2}x + \frac{1}{4} \sin 2x + C$

b) $4 \int (2 - \sin^2 x) \, dx = 4 \int \left(2 - \left(\frac{1}{2}(1 - \cos 2x)\right)\right) dx$

$= 4 \cdot \int \left(\frac{3}{2} + \frac{1}{2} \cos 2x\right) dx = \int (6 + 2 \cos 2x) \, dx$

$= 6x + \sin 2x + C$

c) $\int \sin^2 x \, dx + \int \cos^2 x \, dx$

$= \int (\sin^2 x + \cos^2 x) \, dx = \int 1 \, dx = x + C$

270. a) $\int \frac{e^x + 1}{e^x} \, dx = \int \left(1 + \frac{1}{e^x}\right) dx$

$= \int \left(1 + e^{-x}\right) dx$

$= \int 1 \, dx + \int e^{-x} \, dx$

$= x - e^{-x} + C = x - \frac{1}{e^x} + C$

b) $$\int \frac{6e^x}{(e^x-1)^3}\,dx = 6\int e^x(e^x-1)^{-3}\,dx$$

$s(x) = e^x - 1$

$s'(x) = e^x$

$u(x) = x^{-3}$

$$= 6\cdot\frac{1}{-2}(e^x-1)^{-2} + C$$

$$= -\frac{3}{(e^x-1)^2} + C$$

S. 29: 253, 255, 256, 262

S. 35: 264, 265, 268, 272