3.3 INNSETNINGARAÐFERÐIN BLS. 77

SAMSETT FALL

REGLA 3.8 BLS. 77

$$\int f(g(x)) \cdot g'(x)\,dx = \int f(t)\cdot dt = F(t)+K = F(g(x))+K$$

$t = g(x)$

$dt = g'(x)dx$

DÆMI 3.19 BLS. 77

$$\int e^{\sin(x)} \cdot \cos(x)\,dx = \int e^t \cdot dt = e^t + K = e^{\sin(x)} + K$$

$t = \sin(x)$

$dt = \cos(x)dx$

PRÓFA NIÐURSTÖÐU MEÐ DIFFRUN

HVAÐA STÆRÐIR VIKJA ÚR HEILDINNI FYRIR t ?

1. VELDISVÍSAR
2. STÆRÐIR INNI Í SVIGA
3. STÆRÐIR UNDIR RÓT
4. NEFNARI

DÆMI 3.18 BLS. 77

$$\int \cos(5x)\,dx = \frac{\sin(5x)}{5} + K = \frac{1}{5}\cdot\sin(5x) + K$$

FJÖLDI Á x

MEÐ INNSETNINGU

$$\int \cos(5x)\,dx = \int \cos(t)\cdot\frac{1}{5}dt = \frac{1}{5}\int\cos(t)dt = \frac{1}{5}\cdot\sin(t)+K = \frac{1}{5}\cdot\sin(5x)+K$$

$t = 5x$

$\frac{dt}{5} = \frac{5\cdot dx}{5} \Rightarrow \frac{1}{5}dt = dx$

AUKADÆMI (EKKI Í BÓK)

$$\int (x^3+4)^5 \cdot x^2 dx = \int t^5 \cdot \frac{1}{3} dt = \frac{1}{3}\int t^5 dt = \frac{1}{3}\cdot\frac{t^6}{6} + K = \frac{t^6}{18} + K$$

$$= \frac{(x^3+4)^6}{18} + K$$

$t = x^3 + 4$

$dt = 3x^2 dx \Rightarrow \frac{1}{3} dt = x^2 \cdot dx$

DÆMI 3.21 BLS. 78

$$\int \frac{\ln(x)}{x} dx = \int \ln(x) \cdot \frac{1}{x} dx = \int t \cdot dt = \frac{t^2}{2} + K = \frac{\ln^2(x)}{2} + K$$

$t = \ln(x)$

$dt = \frac{1}{x} dx$

DÆMI 3.22 BLS. 78 (BRÉYTT)

$$\int \sin^4(x) \cdot \cos(x) dx = \int (\sin(x))^4 \cdot \cos(x) dx = \int t^4 \cdot dt = \frac{t^5}{5} + K$$

$t = \sin(x)$

$dt = \cos(x) dx$

$$= \frac{\sin^5(x)}{5} + K$$

AUKADÆMI

a) $\int x^2\sqrt{x^3-4}\,dx = \int \sqrt{x^3-4}\cdot x^2 dx = \int \sqrt{t}\cdot\frac{1}{3}dt = \frac{1}{3}\int t^{1/2}dt$

$t = x^3 - 4$

$\frac{dt}{3} = \frac{3x^2dx}{3}$

$\frac{1}{3}dt = x^2dx$

$\frac{1}{3}\cdot\frac{t^{3/2}}{3/2} + K = \frac{1}{3}\cdot\frac{2}{3}\cdot\sqrt{t^3} + K = \frac{2}{9}\cdot\sqrt{(x^3-4)^3} + K$

b) $\int e^{x^2}\cdot x\,dx = \int e^t\cdot\frac{1}{2}dt = \frac{1}{2}\int e^t dt = \frac{1}{2}\cdot e^t + K = \frac{1}{2}\cdot e^{x^2} + K$

$t = x^2$

$\frac{dt}{2} = \frac{2x\,dx}{2} \Rightarrow \frac{1}{2}dt = x\,dx$

c) $\int \frac{2x}{x^2-4}\,dx = \int \frac{dt}{t} = \int \frac{1}{t}\cdot dt = \ln|t| + K = \ln|x^2-4| + K$

$t = x^2 - 4$

$dt = 2x\,dx$

AF. 3.3 BLS. 87

1. 1. a) - i)

3. a) - f)

4. a)