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**Pr. 16113**

$F_1(x) = \sin(2x) = 2\cdot\sin(x)\cdot\cos(x)$

$F_2(x) = (\cos x + \sin x)^2 = \cos^2 x + 2\cdot\sin x\cdot\cos x + \overset{1}{\sin^2 x} = 2\sin\cdot\cos x + \textcircled{1}$

$(F_1(x))' = 2\cdot\sin x\cdot\cos x$

$\frac{1}{3}+1$

**Pr: 16116**

$\int(4+\frac{1}{x}+\sqrt[3]{x})\,dx = \underline{4x + \ln|x| + x^{\frac{4}{3}}\cdot\frac{3}{4}+C}$

**Pr. 16120**

$\int(2+x^3)^2\,dx = \int(4+4x^3+x^6)\,dx = 4x+\cancel{4}\cdot\frac{x^4}{\cancel{4}}+\frac{x^7}{7}+C = 4x+x^4+\frac{x^7}{7}+C$

**Per partes** $\left(\int u'v\,dx = -\int(u v')\,dx + u\cdot v\right)$

Pr. $\int(x^5\cdot\ln(x))\,dx = \left|\begin{array}{cc}\ln(x) & x^5\\ \frac{1}{x} & \frac{x^6}{6}\end{array}\right| = \ln(x)\cdot\frac{x^6}{6} - \int\frac{1}{x}\cdot\frac{x^6}{6} =$

$= \ln(x)\cdot\frac{x^6}{6} - \int\frac{x^5}{6}\,dx = \ln(x)\cdot\frac{x^6}{6}-\frac{1}{6}\cdot\frac{x^6}{6}+C = \underline{\ln(x)\cdot\frac{x^6}{6}-\frac{x^6}{36}}$

## Př. 16123

$$\begin{vmatrix} \cos x & e^x \\ -\sin x & e^x \end{vmatrix}$$

$$t = \int e^x \cdot \sin x = \begin{vmatrix} \sin x & e^x \\ \cos x & e^x \end{vmatrix} = \sin x \cdot e^x - \int (\cos(x) \cdot e^x)\, dx =$$

$$= e^x \sin x - \left(\cos x \cdot e^x + \int \sin x \cdot e^x\right) = e^x \cdot (\sin x - \cos x) - t$$

$$t = e^x \cdot (\sin x - \cos x) - t$$

$$2t = e^x (\sin x - \cos x)$$

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

$$\int e^{4x+3} dx = \begin{vmatrix} u = 4x+3 \\ du = 4dx \end{vmatrix}$$

$$\frac{1}{4} e^{4x+3}$$

## Př. 16121

chci snížit stupeň

$$\int \left( (e^{4x+3}) \cdot (x + x^2) \right) dx = \begin{vmatrix} x^2 + x & e^{4x+3} \\ 2x & \frac{1}{4} e^{4x+3} \end{vmatrix}$$

$$= (x^2+x) \cdot \frac{1}{4} \cdot e^{4x+3} - \int 2x \cdot \frac{1}{4} e^{4x+3} = (x^2+x) \cdot \frac{1}{4} e^{4x+3} - \frac{1}{2} \int x \cdot e^{4x+3}$$

$$= \begin{vmatrix} x & e^{4x+3} \\ 1 & \frac{1}{4} e^{4x+3} \end{vmatrix} (x^2+x) \cdot \frac{1}{4} \cdot e^{4x+3} - \frac{1}{2} \cdot \left[ x \cdot \frac{1}{4} e^{4x+3} - \frac{1}{4} \int e^{4x+3} \right] =$$

$$= (x^2+x) \cdot \frac{1}{4} \cdot e^{4x+3} - \frac{1}{2} \cdot \left( x \cdot \frac{1}{4} e^{4x+3} + \frac{1}{4} \cdot \frac{1}{4} e^{4x+3} \right) = (x^2+x) \cdot \frac{1}{4} e^{4x+3} - \frac{1}{2} \cdot \frac{1}{4} \cdot x \cdot e^{4x+3} -$$

$$\frac{1}{2} \cdot \frac{1}{4} \cdot \frac{1}{4} \cdot e^{4x+3} = \frac{1}{4} e^{4x+3} \cdot \left( (x^2+x) - \frac{1}{2} x - \frac{1}{8} \right) + C$$

$e^{4x+3}\cdot(ax^2+bx+c)$ (( uhádnuh 😮

$F'(x)=f(x)=e^{4x+3}\cdot(\;x^2(4a)+x(4b+2a)+1(4c+b))$

$$\begin{array}{ccc} \downarrow a & \downarrow b & \downarrow 0 \\ & & c \\ \frac{1}{4} & \frac{1}{8} & -\frac{1}{32} \end{array}$$

Pr. Custom

$$\int(e^{4x+3}\cdot x^{10})\,dx = NN$$

## Substituce

$$(f(g(x)))' = f'(g(x))\cdot g'(x)$$

**Pr. 16132**

$$\int(x\cdot\sqrt{x^2+1})\,dx = \quad \left| \begin{array}{l} u = x^2 \\ u' = 2x\,dx \end{array} \right.$$

$$= \frac{1}{2}\int\sqrt{u+1}\,du = \frac{2}{6}\cdot(u+1)^{\frac{3}{2}}+C = \underline{\frac{1}{3}\cdot(x^2+1)^{\frac{3}{2}}+C}$$

$$\int e^{4x+3}dx = \quad \left| \begin{array}{l} u = 4x+3 \\ du = 4dx \end{array} \right.$$

$$\frac{1}{4}\int e^{u}du = \frac{1}{4}e^{4x+3}$$

**Pr: 16145**

$$\int \left(\frac{x}{x^4+1}\right)dx = \quad \left| \begin{array}{l} u = x^2 \\ du = 2x\,dx \end{array} \right.$$

$$= \int \frac{\cancel{x}}{u^2+1}\cdot\frac{1}{2\cancel{x}}du = \frac{1}{2}\cdot\int\frac{1}{u^2+1}du = \frac{1}{2}\,\mathrm{arctg}(u) + C =$$

$$= \underline{\frac{1}{2}\,\mathrm{arctg}(x^2) + C}$$