ESEMPIO

$$\int |1-x^2|\,dx = (\cdot) \qquad 1-x^2 \geq 0$$

$$|1-x^2| = \begin{cases} \text{se } -1 \leq x < 1 & 1-x^2 \\ \text{se } x < -1 & x^2-1 \\ \text{se } x \geq 1 & x^2-1 \end{cases}$$

$$= (\cdot) + C + \begin{cases} x - \frac{x^3}{3} & \text{se } -1 \leq x < 1 \\ \frac{x^3}{3} - x & \text{se } x < -1 \\ \frac{x^3}{3} - x & \text{se } x \geq 1 \end{cases}$$

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$$\int |2x-1|\,dx = (\cdot) \qquad 2x-1 \geq 0 \quad x \geq \frac{1}{2}$$

$$(\cdot) = \begin{cases} \int (2x-1)\,dx & \text{se } x \geq \frac{1}{2} \\ \int (1-2x)\,dx & \text{se } x < \frac{1}{2} \end{cases}$$

$$= C + \begin{cases} \frac{2x^2}{2} - x & \text{se } x \geq \frac{1}{2} \\ x - 2\frac{x^2}{2} & \text{se } x < \frac{1}{2} \end{cases}$$

$$\frac{1}{4}(2x-1)|2x-1|$$

$$\frac{1}{4}(2x-1)^2 \quad x \geq \frac{1}{2}$$

$$-\frac{1}{4}(2x-1)^2 \quad x < \frac{1}{2}$$

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$$\int x e^{3x+4}\,dx = \int x e^{3x} e^{4}\,dx = \frac{e^4}{3}\int 3x e^{3x}\,dx =$$

$3x = t \quad x = \frac{t}{3} \quad dx = \frac{1}{3}dt$

$$\frac{e^4}{3}\int t e^t \frac{1}{3}dt = \frac{e^4}{9}\int \underset{f}{t}\,\underset{g'}{e^t}\,dt = \frac{e^4}{9}\left[t e^t - \int e^t dt\right] =$$

$= \dots\dots\dots$

$$\int x e^{3x+4}\,dx \qquad 3x+4 = t \quad x = \frac{t}{3} - \frac{4}{3}$$

$$dx = \frac{1}{3}dt$$

$$= \int \left(\frac{t}{3} - \frac{4}{3}\right) e^t \frac{1}{3}dt =$$

$$\frac{1}{9}\int t e^t dt - \frac{4}{9}\int e^t dt = \dots\dots$$

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$$\int \frac{x+5}{\sqrt{x-3}}\,dx = \int \frac{x}{\sqrt{x-3}}\,dx + 5\int \frac{1}{\sqrt{x-3}}\,dx =$$

$$\int \frac{x}{\sqrt{x-3}}\,dx + 5\int (x-3)^{-\frac{1}{2}} d(x-3) = (**)$$

$\sqrt{x-3} = t \quad x-3 = t^2 \quad dx = 2t\,dt$

$x = t^2 + 3$

$$\int \frac{x}{\sqrt{x-3}}\,dx = \int \frac{(t^2+3)}{t} 2t\,dt = 2\int (t^2+3)\,dt = 2\left(\frac{t^3}{3} + 3t\right) + C$$

$$(**) = \frac{2}{3}(x-3)^{\frac{3}{2}} + 6(x-3)^{\frac{1}{2}} + C_1 + 5\frac{1}{\frac{1}{2}}(x-3)^{\frac{1}{2}} + C_2$$

$$\frac{2}{3}\sqrt{(x-3)}\,(x-3) + 16\sqrt{x-3} + K =$$

$$= 2\sqrt{x-3}\left[\frac{1}{3}(x-3) + 8\right] + K.$$

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$$\int \frac{10x-16}{x(x-2)(x-4)}\,dx \qquad \frac{A}{x} + \frac{B}{x-2} + \frac{C}{x-4} = \frac{10x-16}{x(x-2)(x-4)}$$

N323

$$\int \frac{x^4-4x^3}{x^2-2x+1}\,dx =$$

$$\begin{array}{r|l} x^4-4x^3+0x^2+0x+0 & x^2-2x+1 \\ \hline x^4-2x^3+x^2 & x^2-2x-5 \\ \hline -2x^3-x^2+0x+0 & \\ -2x^3+4x^2-2x & \\ \hline -5x^2+2x+0 & \\ -5x^2+10x-5 & \\ \hline -8x+5 & \end{array}$$

$$= \int \left[(x^2-2x-5) + \frac{-8x+5}{x^2-2x+1} \right] dx$$

$$\frac{x^3}{3} - 2\frac{x^2}{2} - 5x + C_1 - \int \frac{8x-5}{x^2-2x+1}\,dx =$$

$$8x-5 = (2x-2)+6x-3$$

$$\int \frac{8x-5}{x^2-2x+1}\,dx = \int \frac{2x-2}{x^2-2x+1}\,dx + 3\int \frac{2x-1}{x^2-2x+1}\,dx =$$

$$\ln|x^2-2x+1| + 3\int \frac{2x-1-1+1}{(x-1)^2}\,dx =$$

$$= \ln|x^2-2x+1| + C_1 + 3\left[\int \frac{2x-2}{(x-1)^2}\,dx + \int \frac{1}{(x-1)^2}\,dx \right]$$

$$= 4\ln(x-1)^2 - 1 - 3\int (x-1)^{-2}\,dx + K$$

$$= 4\ln(x-1)^2 - \frac{3}{x-1} + K =$$

$$= 8\ln|x-1| - \frac{3}{x-1} + K.$$

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$$\int \left(\cos^3 x - \operatorname{sen}^3 x\right) dx = \int \cos^3 x\,dx - \int \operatorname{sen}^3 x\,dx =$$

$$(\cos x - \operatorname{sen} x)(\cos^2 x + \operatorname{sen} x \cos x + \operatorname{sen}^2 x)$$

$$(\cos x - \operatorname{sen} x)\quad(1 + \operatorname{sen} x \cos x)$$

$$= \int \cos^2 x \cdot \underbrace{\cos x}_{f'}\,dx - \int \operatorname{sen}^2 x \operatorname{sen} x\,dx$$

$$\operatorname{sen} x \cos^2 x - \int \operatorname{sen} x\,(2\cos x \operatorname{sen} x)\,dx -$$