Calcolare i seguenti integrali

1) $\displaystyle\int \frac{\cos(\ln x) + \ln x}{x}\,dx$ 2) $\displaystyle\int e^x \,\text{sen}\,x\,dx$

3) $\displaystyle\int \frac{\sin x}{\sqrt[3]{2+3\cos x}}\,dx$ 4) $\displaystyle\int_0^4 (5\sqrt{x} - 4x^3)\,dx$

1) $\displaystyle\int \frac{1}{x}\cos(\ln x)\,dx + \int \frac{1}{x}\ln x\,dx = \text{sen}(\ln x) + \frac{1}{2}\ln^2 x + c$

2) $\displaystyle\int e^x\,\text{sen}\,x\,dx = $ (integro x parti) $f = e^x \quad f' = e^x$

$g' = \text{sen}\,x \quad g = -\cos x$

$$\int e^x\,\text{sen}\,x\,dx = -e^x\cos x + \underbrace{\int e^x\cos x\,dx}_{\to} =$$

$f = e^x \quad f' = e^x$

$g' = \cos x \quad g = \text{sen}\,x$

$\Downarrow$

$= e^x \cdot \text{sen}\,x - \displaystyle\int e^x\,\text{sen}\,x\,dx$

$$= -e^x\cos x + e^x\,\text{sen}\,x - \int e^x\,\text{sen}\,x\,dx$$

$\Downarrow$

$$2\int e^x\,\text{sen}\,x = e^x\,\text{sen}\,x - e^x\cos x$$

$$\int e^x\,\text{sen}\,x = \frac{1}{2}e^x(\text{sen}\,x - \cos x) + c$$

3) $\displaystyle\int \text{sen}\,x\,(2+3\cos x)^{-\frac{1}{3}}\,dx = -\frac{1}{3}\int -3\,\text{sen}\,x\,(2+3\cos x)^{-1/3}\,dx = -\frac{1}{3}\,\frac{(2+3\cos x)^{2/3}}{2/3}$

$= -\dfrac{1}{2}\sqrt{(2+3\cos x)^2} + c$

4) $\displaystyle 5\int_0^4 x^{1/2}\,dx - 4\int_0^4 x^3\,dx = \frac{5x^{3/2}}{\frac{3}{2}} - \cancel{4}\frac{x^4}{\cancel{4}}\Bigg]_0^4 = \frac{10}{3}\sqrt{x^3} - x^4\Bigg]_0^4 =$

$= \left(\dfrac{10}{3}\cdot 8 - 256\right) = \dfrac{80}{3} - 256 = -\dfrac{688}{3}$