(1) $\int_0^2 \frac{8+x^2}{4+x^2}\,dx$

$$\int \frac{8+x^2}{4+x^2}\,dx = \int \frac{4+4+x^2}{4+x^2}\,dx = \int \frac{4}{4+x^2}\,dx + \int \frac{4+x^2}{4+x^2}\,dx = \int \frac{4}{4+x^2}\,dx + x$$

$$\int \frac{4}{4+x^2} = 4\int \frac{1}{2^2+x^2} = \overset{2}{\cancel{4}} \cdot \frac{1}{\cancel{2}}\, \mathrm{atg}\,\frac{x}{2}$$

$$2\,\mathrm{atg}\,\frac{x}{2} + x + c$$

$$\int_0^2 \frac{8+x^2}{4+x^2}\,dx = (2\,\mathrm{atg}\,1 + 2) - 2\,\mathrm{atg}\,0 = \frac{\pi}{2} + 2$$

(2)

$$2\int_0^x e^{2t-3}\,dt + e^{-3} = 1 \qquad \int 2\cdot e^{2t-3}\,dt = e^{2t-3} + c$$

$$e^{2x-3} - e^{2\cdot 0-3} + e^{-3} = 1$$

$$\frac{e^{2x}}{e^3} - \cancel{\frac{1}{e^3}} + \cancel{\frac{1}{e^3}} = 1$$

$$e^{2x} = e^3 \qquad 2x = 3$$

$$x = \frac{3}{2}$$

③ $\lim\limits_{x\to-\infty} \int_x^0 t e^{-t^2}\,dt$ $\qquad -\frac{1}{2}\int -2t e^{-t^2}\,dt = -\frac{1}{2}\cdot e^{-t^2} + c = \frac{-1}{2e^{t^2}} + c$

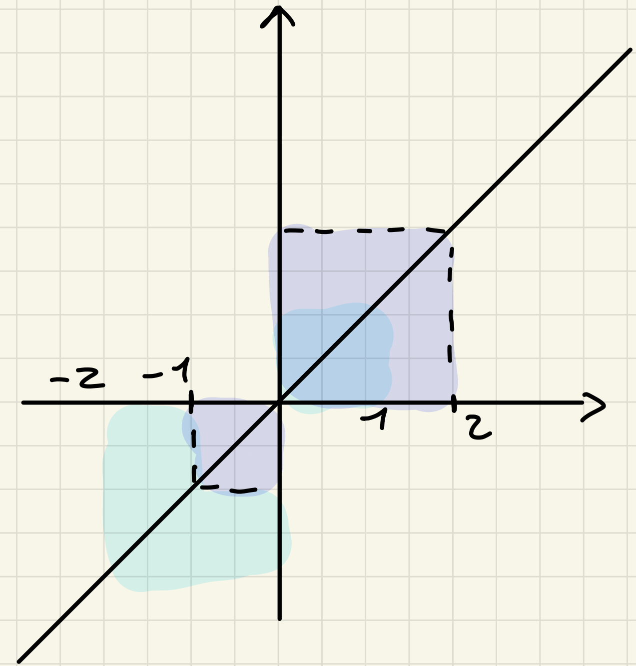
$$\int_x^0 t e^{-t^2}\,dt = -\frac{1}{2e^{0^2}} + \frac{1}{2e^{x^2}} = -\frac{1}{2} + \frac{1}{2e^{x^2}}$$

$$\lim_{x\to-\infty} -\frac{1}{2} + \underbrace{\frac{1}{\underbrace{2e^{x^2}}_{\infty}}}_{0} = -\frac{1}{2}$$

4 $f: \mathbb{R} \to \mathbb{R}$ f.ne continua dispari

$$\int_{-1}^{2} f(x)\,dx$$

$$F(2) - F(-1)$$



5 $f(x) = xe^{x}$

$\int xe^{x}$ $\quad f(x) = x \quad f'(x) = 1$

$g'(x) = e^{x} \quad g(x) = e^{x}$

$$\frac{f(a) - f(b)}{b - a}$$

$xe^{x} - \int e^{x}\,dx = xe^{x} - e^{x} \qquad e^{x}(x - 1)$

$$\frac{1}{2}\left(e^{1}(0) - \left(e^{-1}(-2)\right)\right)$$

$$\frac{1}{2} \quad \frac{+2}{e} = \frac{1}{e} = e^{-1}$$

6

$$f(x) = \begin{cases} 2x & x < 0 \\ 3x^2 & x \geq 0 \end{cases}$$

$$\int_{-1}^{2} f(x) = \int_{-1}^{0} 2x\,dx + \int_{0}^{2} 3x^2 dx = 7$$

$$2\int x\,dx = x^2 + c \qquad 3\int x^2 dx = x^3 + c$$

$$2\int_{-1}^{0} x\,dx = 0^2 - ((-1)^2) = -1 \qquad \int_{0}^{2} x^2 = 8$$

⑦ $g:(0,+\infty)\to\mathbb{R}$

$$g(x)=\int_1^{x^2}\frac{\ln t}{t}\,dt$$

$x\in(0,+\infty)$

$g'(x)$ è:

$$\int \frac{1}{t}(\ln t)^1\,dt=\frac{\ln^2 t}{2}+c$$

$$\frac{\ln^2 x^2}{2}-\frac{\ln^2 1}{2}=\frac{2\ln^2 x}{}=g(x)$$

$$g'(x)=\frac{4\ln x}{x}$$

⑧ $$\int_1^3 \frac{|x-2|}{x}\,dx = \int_1^2 \frac{-x+2}{x}\,dx + \int_2^3 \frac{x-2}{x}\,dx$$

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

$$-x + 2\ln|x| + c$$

$$\int_1^2 \frac{-x+2}{x} = \left(-2+2\ln|2|\right) - \left(-1+2\ln|1|\right) =$$

$$-2+2\ln|2| + 1 = 2\ln|2| - 1$$

$$\int \frac{x-2}{x}\,dx$$

$$\int 1\,dx - 2\int \frac{1}{x}\,dx = x - 2\ln|x| + c$$

$$\int_2^3 \frac{x-2}{x}\,dx = \left(3-2\ln|3|\right) - \left(2-2\ln|2|\right)$$

$$1 - 2\ln|3| + 2\ln|2|$$

$$2\ln 2 + 2\ln 2 - 2\ln 3 = 4\ln 2 - 2\ln 3$$