$$\boxed{f'(x) = 1-x-x^2} \quad \text{et} \quad \boxed{f(0)=8}$$

$$\Leftrightarrow \quad f(x) = \int (1-x-x^2)\,dx$$

(1 seule primitive possible)

$$= \int 1\,dx - \int x\,dx - \int x^2\,dx$$

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

$$f(0) = 0 - \frac{1}{2}0^2 - \frac{1}{3}0^3 + C = \boxed{C = 8}$$

$$\Rightarrow \quad f(x) = 8 + x - \frac{1}{2}x^2 - \frac{1}{3}x^3$$

Autre cond: $f(2) = 8$

$$f(2) = 2 - \frac{1}{2}2^2 - \frac{1}{3}2^3 + C = 8$$

$$\cancel{2} - \cancel{2} - \frac{8}{3} + C = 8$$

$$C = 8 + \frac{8}{3} = \frac{32}{3}$$

$$\Rightarrow f(x) = \frac{32}{3} + x - \frac{1}{2}x^2 - \frac{1}{3}x^3$$

$$\boxed{\begin{aligned} x'' &= g \\ x' &= g \cdot t + v_0 \\ x &= \frac{1}{2} g t^2 + v_0 t + x_0 \end{aligned}}$$

$$\int_0^1 5x\,(x^2-1)^2\,dx =$$

$$\frac{5}{2}\int_0^1 (x^2-1)^2 \cdot \underbrace{2x} \cdot dx = \boxed{\frac{5}{2}\cdot\frac{1}{3}}\;\overbrace{\boxed{(x^2-1)^3\Big|_0^1}}^{F(x)}$$

$$\underbrace{(x^2-1)^2} \cdot \underbrace{(x^2-1)'\,dx}$$

$$\int T^2\,dT = \frac{1}{3}T^3$$

$$T = x^2 - 1$$

$$= \frac{5}{6}\underbrace{\left((1^2-1)^3 - (0^2-1)^3\right)}_{F(1)\,-\,F(0)}$$

$$= \frac{5}{6}\left(0 - (-1)^3\right) = \frac{5}{6}$$

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

$$\frac{1}{f(x)}\,f'(x) \quad ?$$

div. eucl.

$$\frac{13}{2} = 6 \text{ reste } 1$$

$$\begin{array}{r|l} x^2-x+1 & x-1 \\ \hline x^2-x & x \\ \hline 1 & \end{array}$$

$$\begin{array}{r|l} 13 & 2 \\ \hline 12 & 6 \\ \hline 1 & \end{array}$$

$$13 = 2\cdot 6 + 1$$

$$x^2-x+1 = x(x-1)+1$$

$\div (x-1)$ $\qquad$ $\div (x-1)$

$$\frac{x^2-x+1}{x-1} = \frac{x(x-1)+1}{x-1} = \frac{x\cancel{(x-1)}}{\cancel{x-1}} + \frac{1}{x-1}$$

$$= x + \frac{1}{x-1}$$

$$\int \frac{x^2-x+1}{x-1}\,dx = \int x\,dx + \int \frac{1}{x-1}\cdot \underbrace{1}_{(x-1)'} \cdot\, dx$$

$$\boxed{= \frac{1}{2}x^2 + \ln|x-1| + C}$$

$$\int \frac{1}{t}\,dt = \ln|t| + C$$

$$\int x^n\,dx = \frac{1}{n+1}x^{n+1} + C$$

$$\boxed{\frac{\overbrace{x(x-1)+1}^{x^2-x+1}}{(x-1)}} = \frac{x\cancel{(x-1)}}{\cancel{(x-1)}} + \frac{1}{(x-1)} \qquad \frac{3\cdot 4+1}{4} = \frac{3\cdot\cancel{4}}{\cancel{4}} + \frac{1}{4}$$

$$= 3 + \frac{1}{4}$$

$$x\cdot(x-1)+1 = x\cdot x + x\cdot(-1)+1 = x^2-x+1$$

$$= \boxed{x + \frac{1}{x-1}}$$

$$\int \frac{x^2-x+1}{x-1}\,dx = \int\left(x+\frac{1}{x-1}\right)dx$$

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

$$= \frac{1}{2}x^2 + \int \frac{1}{x-1} \cdot (x-1)' \cdot dx$$

$$= \frac{1}{2}x^2 + \ln|x-1| + C$$

Intégration

1. Formules (cf. dérivées / intégrales dans le form.)
2. Algèbre
3. « Dérivée interne »
4. Fractions de polynômes par division euclidienne (utilisation de ln)

$$\int_a^b f(x)\,dx = F(x)\Big|_a^b = F(b) - F(a)$$

avec $F'(x) = f(x)$

$$\frac{1+\sqrt{x}}{\sqrt{x}} \longrightarrow x^{-\frac{1}{2}} + 1$$

$$\frac{1+\sqrt{x}}{\sqrt{x}} = \frac{1}{\sqrt{x}} + \frac{\sqrt{x}}{\sqrt{x}} = \frac{1}{x^{\frac{1}{2}}} + 1 = x^{-\frac{1}{2}} + 1$$