

Ex feuille

1. $\frac{1}{3}x^3 + C$

2. $\frac{1}{4}x^4 + C$

3. $\frac{7}{5}x^5 + C$

vérif: $(\frac{7}{5}x^5 + C)' = \frac{7}{5} \cdot 5x^4 = 7x^4 \checkmark$

4. $3u + C$

5. $t^3 + \frac{5}{2}t^2 - t + C$

$(\frac{5}{2}t^2)' = \frac{5}{2} \cdot 2t = 5t$
 $\int 5t dt = 5 \int t dt$
 $= 5 \cdot \frac{1}{2}t^2 + C$

$\int (3t^2 + 5t - 1) dt$

$= 3 \int t^2 dt + 5 \int t dt - \int dt$

$= 3 \cdot \frac{1}{3}t^3 + 5 \cdot \frac{1}{2}t^2 - t + C$

$$6. \int \frac{1}{t^2} dt = \int t^{-2} dt = \frac{1}{-1} t^{-1} + C = \underline{-\frac{1}{t} + C}$$

$$7. \int \sqrt{v} dv = \int v^{\frac{1}{2}} dv = \frac{1}{\frac{3}{2}} v^{\frac{3}{2}} + C = \underline{\frac{2}{3} \sqrt{v^3} + C}$$

$$8. \int \sqrt[3]{x} dx = \int x^{\frac{1}{3}} dx = \frac{1}{\frac{4}{3}} x^{\frac{4}{3}} + C = \underline{\frac{3}{4} \sqrt[3]{x^4} + C}$$

$$9. \int \frac{5}{\sqrt[4]{x^3}} dx = \int 5x^{-\frac{3}{4}} dx = 5 \cdot \frac{1}{\frac{1}{4}} x^{\frac{1}{4}} + C \\ = \underline{20 \sqrt[4]{x} + C}$$

$$10) \int \frac{3}{\sqrt{4x+1}} dx = \int 3 \cdot (4x+1)^{-1/2} dx = \frac{3}{4} \int \underbrace{(4x+1)^{-1/2}}_u \cdot \underbrace{4 dx}_{u'} = \frac{3}{4} \cdot \frac{1}{-\frac{1}{2}+1} (4x+1)^{1/2} + C = \frac{3}{4} \cdot 2 \sqrt{4x+1} + C = \underline{\underline{\frac{3}{2} \sqrt{4x+1} + C}}$$

$u = 4x+1$
 $u' = 4$

$$11) \int \underbrace{(3u^2+5u-1)^3}_{v^3} \cdot \underbrace{(6u+5)}_{v'} du = \frac{1}{3+1} (3u^2+5u-1)^{3+1} + C = \frac{1}{4} (3u^2+5u-1)^4 + C$$

$v = 3u^2+5u-1$
 $v' = 6u+5$

$$12) \int 2x \cdot (1+x^2)^{-3} dx = \frac{1}{-2} (1+x^2)^{-2} + C = -\frac{1}{2(1+x^2)^2} + C$$

$u = 1+x^2$
 $u' = 2x$

$$14) \int \frac{\ln^2(x)}{x} dx = \int \underbrace{\ln^2(x)}_{u^2} \cdot \underbrace{\frac{1}{x} dx}_{u'} = \frac{1}{3} \ln^3(x) + C$$

$u = \ln(x)$
 $u' = \frac{1}{x}$

$$13) \int (x^3+3x^2+2x+1)(3x^2+6x+2) dx = \frac{1}{2} (x^3+3x^2+2x+1)^2 + C$$

Notation:

$$(\ln(x))^2 = \ln^2(x)$$

$$(f(x))^2 = f^2(x)$$

$$\left(\int (x^3+3x^2+2x+1) dx = \frac{1}{4}x^4 + x^3 + x^2 + x + C \right)$$

$$15. \int e^x dx = \underline{e^x + c}$$

$$16. \int 2e^{3t} dt = \frac{2}{3} \int e^{3t} \cdot 3 dt = \underline{\frac{2}{3} e^{3t} + c}$$

$$17. -\int -2x \cdot e^{-x^2} dx = \underline{-e^{-x^2} + c}$$

$$18. \int \frac{1}{x} dx = \underline{\ln(|x|) + c}$$

$$19. \frac{1}{2} \int \frac{2 \cdot 2}{4x-3} dx = \underline{\frac{1}{2} \ln(|4x-3|) + c} = \underline{\ln(\sqrt{|4x-3|}) + c}$$

$$20. \int \frac{2x+3}{x^2+3x+3} dx = \underline{\ln(|x^2+3x+3|) + c}$$