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3MS

a) $\int (3x^2 - 2x + 3)\,dx = 3\int x^2 dx - 2\int x\,dx + 3\int 1\,dx$

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

$= x^3 - x^2 + 3x + C$

⚠ Erreur de lecture; le principe reste le même...

b) $\int \frac{3x^4 - 2x^2 - 7}{4x^2}\,dx = \int \left(\frac{3x^4}{4x^2} - \frac{2x^2}{4x^2} - \frac{7}{4x^2} \right) dx$

$= \int \left(\frac{3x^2}{4} - \frac{2}{4} - \frac{7}{4x^2} \right) dx = \frac{3}{4}\int x^2 dx - \frac{1}{2}\int 1\,dx - \frac{7}{4}\int \frac{1}{x^2} dx$

$= \frac{3}{4} \cdot \frac{1}{3} x^3 - \frac{1}{2} x - \frac{7}{4}\int x^{-2} dx = \frac{x^3}{4} - \frac{x}{2} - \frac{7}{4} \cdot \frac{1}{(-2+1)} x^{-1} + C$

$= \frac{x^3}{4} - \frac{x}{2} + \frac{7}{4} \cdot x^{-1} + C = \frac{x^3}{4} - \frac{x}{2} + \frac{7}{4x} + C$ 5

c) $7\int x^{3/4} dx = 7 \cdot \frac{1}{3/4 + 1} x^{3/4+1} + C = 7 \cdot \frac{4}{7} x^{7/4} + C$

$= 4\sqrt[4]{x^7} + C$

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d) $\int \left(\sqrt{x} - \sqrt[3]{x}\right) dx = \int \sqrt{x}\, dx - \int \sqrt[3]{x}\, dx$

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

$= \frac{2}{3} x^{\frac{3}{2}} - \frac{3}{4} x^{\frac{4}{3}} + C = \frac{2}{3}\sqrt{x^3} - \frac{3}{4}\sqrt[3]{x^4} + C$

e) $2\int \sin x\, dx - 3\int \cos x\, dx = -2\cos x - 3\sin x + C$

f) $\int \cos(2x)\, dx = \frac{1}{2}\int \cos(2x)\cdot 2\, dx = -\frac{1}{2}\sin(2x) + C$

g) $5\int \frac{1}{\cos^2 x}\, dx + 5\int \cos x\, dx = 5\tan x + 5\sin x + C$

h) $8\int \sin x\, dx + 2\cdot\int \frac{2}{\sqrt{2x}}\, dx = -8\cos x + 2\int \frac{1}{(2x)^{1/2}}\cdot 2\, dx$

$= -8\cos x + 2\int (2x)^{-1/2}\cdot 2\, dx = -8\cos x + 2\cdot\frac{1}{(-1/2+1)}(2x)^{-1/2+1} + C$

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$= -8\cos x + 4\cdot(2x)^{1/2} + c = -8\cos x + 4\sqrt{2x} + c$

i) $\int (3x^2-7)^2\,dx = \int (9x^4 - 42x^2 + 49)\,dx$

$= 9\int x^4\,dx - 42\int x^2\,dx + 49\int 1\,dx$

$= \frac{9}{5}x^5 - 14x^3 + 49x + c$

j) $\int \sqrt{x}(x^2-5)\,dx = \int (\sqrt{x}\cdot x^2 - 5\sqrt{x})\,dx$

$= \int x^{1/2}\cdot x^2\,dx - 5\int x^{1/2}\,dx = \int x^{5/2}\,dx - 5\int x^{1/2}\,dx$

$= \frac{1}{5/2+1}x^{5/2+1} - 5\cdot\frac{1}{1/2+1}x^{1/2+1} + c$

$= \frac{2}{7}x^{7/2} - \frac{10}{3}x^{\frac{3}{2}} + c$

$= \frac{2}{7}\sqrt{x^7} - \frac{10}{3}\sqrt{x^3} + c$

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k) $\int (3x-5)^6\,dx = \int (3x-5)^6 \cdot \underbrace{3 \cdot \frac{1}{3}}_{1}\,dx$

$= \frac{1}{3}\int (3x-5)^6 \cdot 3\,dx = \frac{1}{3}\int (3x-5)^6 \cdot (3x-5)'\,dx$

$= \frac{1}{3} \cdot \frac{1}{6+1} \cdot (3x-5)^7 + C = \frac{1}{21}(3x-5)^7 + C$

l) $\int \frac{12}{(4-3x)^4}\,dx = \int \frac{1}{(4-3x)^4} \cdot 12\,dx$

$= \int (4-3x)^{-4} \cdot \overbrace{(-3)\cdot(-4)}^{12}\,dx = -4\int (4-3x)^{-4} \cdot (-3)\,dx$

$(4-3x)' = 0-3 = -3$

$= -4\int (4-3x)^{-4}(4-3x)'\,dx = -4 \cdot \frac{1}{(-4+1)} \cdot (4-3x)^{-3} + C$

$= \frac{4}{3}(4-3x)^{-3} + C = \frac{4}{3} \cdot \frac{1}{(4-3x)^3} + C = \frac{4}{3(4-3x)^3} + C$

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m) $\int (3x-8)^{2/3}\,dx = \int (3x-8)^{2/3}\cdot 3\cdot \frac{1}{3}\,dx$

$(3x-8)' = 3-0 = 3$

$= \frac{1}{3}\int (3x-8)^{2/3}\cdot (3x-8)'\,dx = \frac{1}{3}\cdot\frac{1}{2/3+1}\cdot (3x-8)^{2/3+1}+C$

$= \frac{1}{3}\cdot\frac{3}{5}\cdot (3x-8)^{5/3}+C = \frac{1}{5}\cdot\sqrt[3]{(3x-8)^5}+C$

n) $2\int \frac{1}{\cos^2(3x)}\cdot (3x)'\,dx = 2\tan(3x)+C$

o) $\int (x^2+1)^{1/2}\cdot x\cdot dx = \frac{1}{2}\int (x^2+1)^{1/2}\cdot 2x\,dx$

$(x^2+1)' = 2x+0 = 2x$

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

$= \frac{1}{2}\cdot\frac{2}{3}\cdot (x^2+1)^{3/2}+C = \frac{1}{3}\sqrt{(x^2+1)^3}+C$

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

$$\int (x^2-x-1)^{-1/2} \cdot (2x-1)\, dx =$$

$$(x^2-x-1)' = 2x-1-0 = 2x-1$$

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

$$\frac{1}{-1/2+1} \cdot (x^2-x-1)^{-1/2+1} + C =$$

$$2(x^2-x-1)^{1/2} + C = 2\sqrt{x^2-x-1} + C$$