1) $x^2+2=0 \Leftrightarrow x^2=-2$ ↯

f n'a pas de zeros

$$\Rightarrow A = \int_{-3}^{3} (x^2+2)\,dx = \left(\frac{1}{3}x^3+2x\right)\Big|_{-3}^{3}$$

$$= \left(\frac{1}{3}\cdot 27+6\right) - \left(\frac{1}{3}(-3)^3-6\right)$$

$$= 9+6-(-9-6) = 15+15 = 30$$

2) $9-x^2=0 \Leftrightarrow x^2=9 \Leftrightarrow x=\pm 3$

$f(3)=f(-3)=0$

On doit donc écrire :

$$A = \underbrace{\left|\int_{-4}^{-3} f(x)\,dx\right|}_{A_1} + \overbrace{\int_{-3}^{3} f(x)\,dx}^{A_2} + \underbrace{\left|\int_{3}^{4} f(x)\,dx\right|}_{A_3}$$

Vu que $\int f(x)\,dx = 9x - \frac{1}{3}x^3$, on 2

$$A_1 = \left| \left(9x - \frac{1}{3}x^3\right)\Big|_{-4}^{-3} \right|$$

$$= \left| (-27+9) - \left(-36 + \frac{64}{3}\right) \right|$$

$$= \left| -18 + 36 - \frac{64}{3} \right|$$

$$= \left| \frac{54}{3} - \frac{64}{3} \right| = \left| -\frac{10}{3} \right| = \frac{10}{3}$$

$$A_2 = \left(9x - \frac{1}{3}x^3\right)\Big|_{-3}^{3} = (27-9) - (-27+9)$$

$$= 36$$

$$A_3 = \left| \left(9x - \frac{1}{3}x^3\right)\Big|_{3}^{4} \right|$$

$$= \left| \left(36 - \frac{64}{3}\right) - (27 - 9) \right|$$

$$= \left| 18 - \frac{64}{3} \right| = \frac{10}{3}$$

Finalement,

$$A = \frac{10}{3} + 36 + \frac{10}{3} = \frac{128}{3}$$

3) $f(x) = 0 \Leftrightarrow \frac{4}{x^2} = 1 \Leftrightarrow x^2 = 4 \Leftrightarrow x = \pm 2$

$f(-2) = 0$ et $f(2) = 0$

$$A = \underbrace{\int_1^2 f(x)\,dx}_{A_1} + \underbrace{\left| \int_2^4 f(x)\,dx \right|}_{A_2}$$

$$\int f(x)\,dx = \int (4x^{-2}-1)\,dx$$

$$= 4\frac{1}{-2+1}x^{-2+1} - x$$

$$= -4x^{-1} - x = -\frac{4}{x} - x$$

$$A_1 = \left(-\frac{4}{x}-x\right)\Big|_1^2 = \left(-\frac{4}{2}-2\right)-\left(-4-1\right)$$

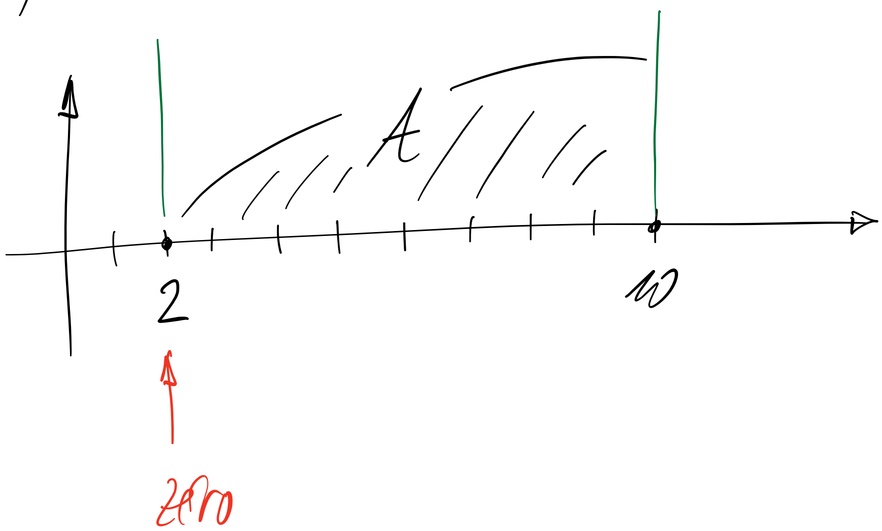
$$= -4+5 = 1$$

$$A_2 = \left|\left(-\frac{4}{x}-x\right)\Big|_2^4\right| = \left|(-1-4)-(-2-2)\right|$$

$$= \left|-5+4\right| = \left|-1\right| = 1$$

Finalement, $A = A_1 + A_2 = 1+1$

4) $f(x) = 0 \Leftrightarrow 2x-4=0 \Leftrightarrow x = \frac{4}{2} = 2$



$$\boxed{\begin{array}{l}\sqrt{A} = 0 \\ \Leftrightarrow A = 0\end{array}}$$

$$\frac{1}{2}\left|\int_2^{10}\sqrt{2x-4}\cdot 2dx\right| = \frac{1}{2}\left|\frac{1}{\frac{1}{2}+1}\cdot(2x-4)^{\frac{1}{2}+1}\Big|_2^{10}\right|$$

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

$$= \frac{1}{2}\cdot\frac{2}{3}\left|(2x-4)^{\frac{3}{2}}\Big|_2^{10}\right|$$

$$\frac{1}{2}\int(2x-4)^{\frac{1}{2}}\cdot(2x-4)'dx =$$

$$= \frac{1}{3}\left|(16)^{\frac{3}{2}} - (0)^{\frac{3}{2}}\right|$$

$$\frac{1}{2}\cdot\frac{1}{\frac{1}{2}+1}(2x-4)^{\frac{1}{2}+1} =$$

$$= \frac{1}{3}\cdot|64| = \frac{64}{3}$$

$$\frac{1}{2}\cdot\frac{2}{3}(2x-4)^{\frac{3}{2}} =$$

$$\frac{1}{3}(2x-4)^{\frac{3}{2}}$$