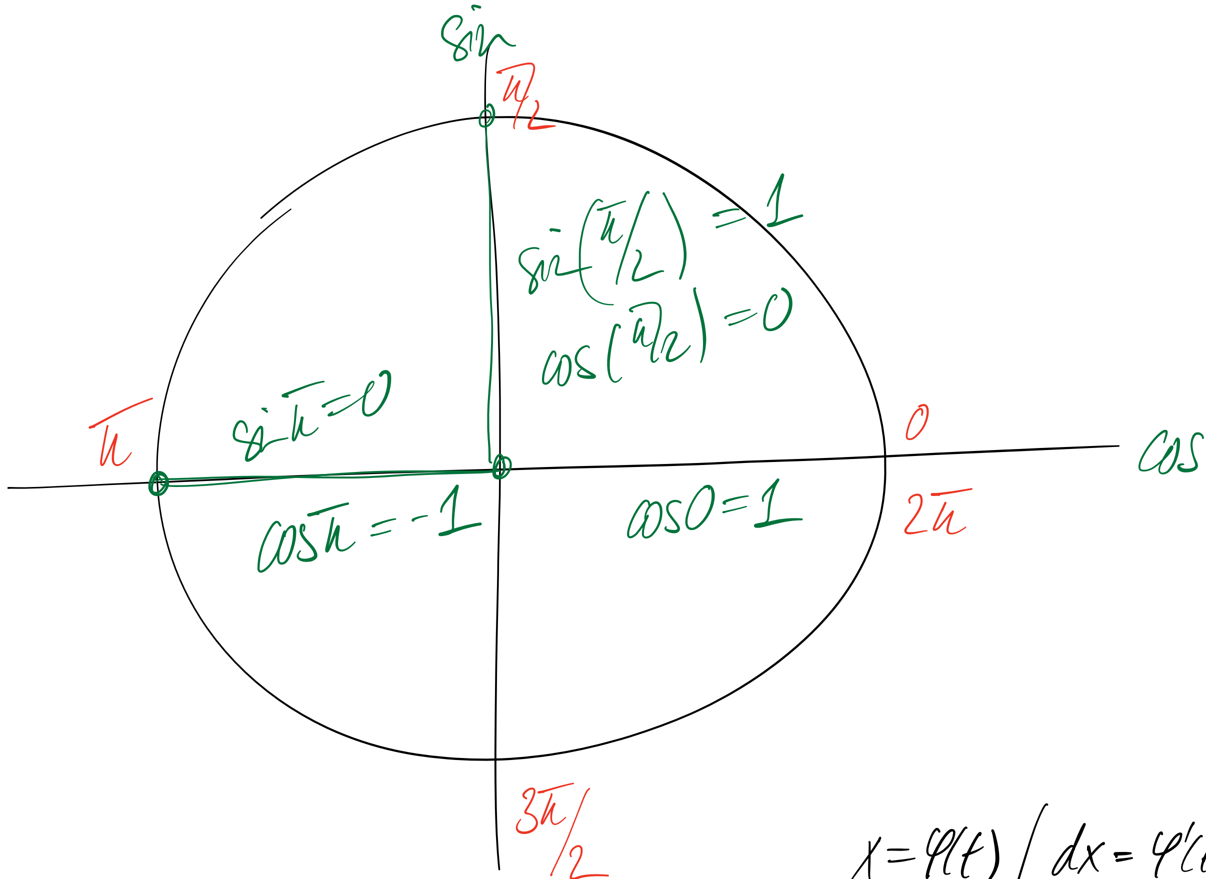

$a>0$

$x=\varphi(t) \,/\, dx=\varphi'(t)\,dt$

$$\int_a^{2a} x^3\cdot\sqrt{x^2-a^2}\,dx =$$

$x=\sqrt{a^2+t^2}$

$dx = \frac{1}{\cancel{2}\sqrt{a^2+t^2}}\cdot\cancel{2}t\,dt$

$$\int_0^{\sqrt{3}\cdot a}\left[\left(\sqrt{a^2+t^2}\right)^2\cdot\cancel{\sqrt{a^2+t^2}}\cdot t\cdot\frac{t}{\cancel{\sqrt{a^2+t^2}}}\right]dt =$$

$x=a=\sqrt{a^2+t^2}$

$t=0$

$x=2a=\sqrt{a^2+t^2}$

$4a^2=a^2+t^2$

$t=\sqrt{3}\,a$

$$\int_0^{a\sqrt{3}}\left(a^2+t^2\right)\cdot t^2\,dt =$$

$$\int_0^{a\sqrt{3}}\left(a^2t^2+t^4\right)dt \leftarrow \text{Faule}$$

$$\boxed{\int \boxed{x\sin x}\, dx}$$

Plus simple à integrer

Inconnu

$$(f \cdot g)' = f' \cdot g + f \cdot g'$$

$$\left(x(-\cos x)\right)' = 1 \cdot (-\cos x) + \boxed{x \cdot \sin x}$$

$$-x\cos x = \int -\cos x \, dx + \int x\sin x \, dx$$

$$\int x\sin x \, dx = \int \cos x \, dx - x\cos x$$

$$= \boxed{\sin x - x\cos x + C}$$

Primitive

$$\frac{x}{x+6} = \frac{P(x)}{Q(x)}$$

1) $P(x) \mid Q(x)$

$$\begin{array}{r|l} x & x+6 \\ \hline x+6 & 1 \\ \hline -6 & \end{array}$$

$$x = (x+6)\cdot 1 - 6$$

$$\frac{x}{x+6} = \frac{\cancel{(x+6)}\cdot 1}{\cancel{x+6}} - \frac{6}{x+6}$$

$$\frac{ax+b}{cx+d}$$

$$\frac{x}{x+6} = 1 - \frac{6}{x+6}$$

$$\int \frac{x}{x+6}\,dx = \int \left(1 - \frac{6}{x+6}\right) dx = \int 1\,dx - 6\int \frac{1}{x+6}\,1\,dx$$

$( )'$

$$= \boxed{x - 6\cdot \ln(x+6) + c}$$

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

$$\int \sin x \cos x \, dx$$

$$(f \cdot g)' = f' \cdot g + f \cdot g'$$

$$\cos x \cdot \sin x + \sin x \cdot \cos x$$

$$(\sin^2 x)' = 2 \sin x \cos x$$

$$\Rightarrow \quad \sin^2 x + C = 2 \int \sin x \cos x \, dx$$

$$\Leftrightarrow \quad \int \sin x \cos x \, dx = \frac{1}{2} \sin^2 x + C$$

$$\frac{1}{2} \frac{1}{2} \int \sin(2x) \, 2 \, dx = -\frac{1}{4} \cos(2x) + C$$

$$2 \sin x \cos x$$

$$\int \sin(2x) \cdot 2 \, dx = -\cos(2x)$$

$$\frac{1}{2}\sin 2x = \frac{1}{\cancel{2}} \cdot \cancel{2}\sin x\cos x$$

$$\int \sin x \cos x \, dx = \int (\sin x)^{1} \cdot (\sin x)' \, dx$$

$$= \frac{1}{2}(\sin x)^2 + C = \frac{1}{2}\sin^2 x + C$$