

ATS 2011

Convergence de  $I = \int_0^{\pi/2} \frac{dt}{\sin t}$

problème en 0:  $\frac{1}{\sin t} \sim \frac{1}{t}$

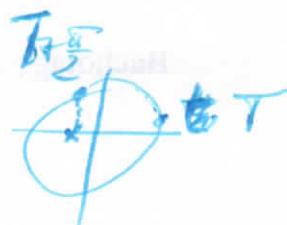
$\int_0^{\pi/2} \frac{1}{t} dt$  Diver (Heurmann)  $\Rightarrow \int_0^{\pi/2} \frac{1}{\sin t} dt$  Diver (T de V)

problème en  $\frac{\pi}{2}$

Convergence de  $J = \int_0^{\pi/2} \frac{1}{\cos t} dt$

chgt  $T = t - \frac{\pi}{2}$

$t = T + \frac{\pi}{2}$



$\cos t = \cos(T + \frac{\pi}{2}) = -\sin(T) \sim -T$   $\Rightarrow -T = \frac{\pi}{2} - t$

$\int_{\frac{\pi}{2}-t}^{\pi/2} \frac{1}{\cos t} dt$  Diver (Heurmann)  $\Rightarrow \int_{-\pi/2}^0 \frac{1}{\sin T} dT$  Diver (T de V)

Calcul de  $\int_{-\pi/2}^{\pi/2} \frac{1}{\cos t} dt$  pour  $x \in ]-\pi/2, \pi/2[$

On utilise la méthode des uvariants

$\frac{1}{\cos(-t)} d(-t) = \frac{1}{\cos t} [-dt] \neq \frac{dt}{\cos t}$

$\frac{1}{\cos(\pi/2 + t)} d(\pi/2 + t) = \frac{1}{-\cos t} dt \neq \frac{dt}{\cos t}$

$\frac{1}{\cos(\pi/2 - t)} d(\pi/2 - t) = \frac{1}{-\cos t} (-dt) = \frac{dt}{\cos t}$  oui - le chgt  $T = \pi/2 - t$  convient