

ATS 204

Calcul de $f(x) = \int_0^{\frac{\pi}{2}} \frac{1}{\cos t} dt$

degt $T = \sin t$ $dT = \cos t dt$

$$f(x) = \int_0^{\sin(\frac{\pi}{2})} \frac{1}{\cos t} \frac{dT}{\cos t} = \int_{T=0}^{\sin(\frac{\pi}{2})} \frac{1}{\cos^2 t} dT$$

Or $\cos^2 t = 1 - \sin^2 t = 1 - T^2$

$$f(x) = \int_0^{\sin(\frac{\pi}{2})} \frac{1}{1-T^2} dT = \int_0^{\sin(\frac{\pi}{2})} \left(\frac{\frac{1}{2}}{1-T} + \frac{\frac{1}{2}}{1+T} \right) dT$$

$$= \frac{1}{2} \left(\left[-\ln|1-T| \right]_0^{\sin(\frac{\pi}{2})} + \left[\ln|1+T| \right]_0^{\sin(\frac{\pi}{2})} \right)$$

$$= \frac{1}{2} \left(\ln(1+\sin(\frac{\pi}{2})) - \ln(1-\sin(\frac{\pi}{2})) \right)$$

$$= \frac{1}{2} \ln \left(\frac{1+\sin(\frac{\pi}{2})}{1-\sin(\frac{\pi}{2})} \right)$$