



Ex01

$$1. \int x \sin x dx = -x \cos x + \int \cos x dx = -x \cos x + \sin x + c. \quad (1,5p)$$

$$\int \sin x \cos x dx = \sin^2 x - \int \cos x \sin x dx \rightarrow \int \sin x \cos x dx = \frac{\sin^2 x}{2} + c. \quad (1,5p)$$

$$2. y' = 1+y \rightarrow \frac{dy}{1+y} = dx \rightarrow \ln(1+y) = x + c \rightarrow y = e^{x+c} - 1 = ke^x - 1. \quad (02p)$$

$$y' = xy \rightarrow \frac{dy}{y} = x dx \rightarrow \ln y = \frac{x^2}{2} + c \rightarrow y = e^{\frac{x^2}{2} + c} = ke^{\frac{x^2}{2}}. \quad (02p)$$

Ex02

$$1- 2ch^2(a) = 2 \left(\frac{e^a + e^{-a}}{2} \right)^2 = 2 \left(\frac{e^{2a} + e^{-2a} + 2}{4} \right) = \frac{e^{2a} + e^{-2a}}{2} + 1 = ch(2a) + 1. \quad (1,5p)$$

$$2sh a ch(a) = 2 \left(\frac{e^a - e^{-a}}{2} \right) \left(\frac{e^a + e^{-a}}{2} \right) = \frac{e^{2a} + 1 - 1 - e^{-2a}}{2} = sh(2a). \quad (1,5p)$$

$$\text{De la relation 1- on pose } a = \frac{x}{2} \rightarrow \sqrt{\frac{1+ch x}{2}} = \sqrt{ch^2 \frac{x}{2}} = \frac{|x|}{2}. \quad (1,5p)$$

$$chx = \sqrt{2} \rightarrow e^{2x} - 2\sqrt{2}e^x + 1 = 0$$

$$2- y^2 - 2\sqrt{2}y + 1 = 0 \rightarrow \begin{cases} y_1 = \sqrt{2} + 1 \rightarrow x_1 = \ln(\sqrt{2} + 1). \\ y_2 = \sqrt{2} - 1 \rightarrow x_2 = \ln(\sqrt{2} - 1). \end{cases} \quad (02p)$$

Ex03

$$1. D_f = \mathbb{R} - \left\{ \frac{\pi}{2} + k\pi \right\}. \quad (1,5p)$$

$$2. (\tan x)' = \frac{1}{\cos^2 x}; \quad \int \tan x dx = -\ln|\cos x| + c. \quad (03p)$$

$$3. \int x \frac{1}{\cos^2 x} dx = x \tan x - \int \tan x dx = x \tan x + \ln|\cos x| + c. \quad (02p)$$

Responsable de module :