

**:01**      ■

$$\forall x \in \mathbb{R} : f''(x) = xe^{-x} : \quad \text{---(3)}$$

$$\forall x \in \mathbb{R} : sg[f''(x)] = sg(x) :$$

$$] -\infty, 0] \quad (C_f)$$

$$[0, +\infty[$$

$$. \Omega(0, 2) :$$

$$\forall \lambda \in \mathbb{R} : A(\lambda) = \int_0^\lambda (x+2)e^{-x} dx : \quad \text{---(5)}$$

$$\begin{cases} u'(x) = 1 \\ v(x) = -e^{-x} \end{cases} : \quad \begin{cases} u(x) = x + 2 \\ v'(x) = e^{-x} \end{cases}$$

$$A(\lambda) = [-(x+2)e^{-x}]_0^\lambda + \int_0^\lambda e^{-x} dx :$$

$$A(\lambda) = 2 - (\lambda+2)e^{-\lambda} + [-e^{-x}]_0^\lambda :$$

$$A(\lambda) = 2 - (\lambda+2)e^{-\lambda} + 1 - e^{-\lambda} :$$

$$\forall \lambda \in \mathbb{R} : A(\lambda) = 3(1 - e^{-\lambda}) - \lambda e^{-\lambda} :$$

$$: \text{---} -$$

$$\begin{cases} \lim_{\lambda \rightarrow +\infty} -\lambda e^{-\lambda} = 0 \\ \lim_{\lambda \rightarrow +\infty} 3(1 - e^{-\lambda}) = 3 \end{cases} \Rightarrow \lim_{\lambda \rightarrow +\infty} A(\lambda) = 3 :$$

$$(C_f)$$

$$. A = 3cm^2 : \quad \mathbb{R}_+$$

**:02**      ■

$$\forall x \in \mathbb{R} : \frac{x^2}{1+x^2} = 1 - \frac{1}{1+x^2} : \quad \text{---(1)}$$

$$I = [x - \text{Arc tan } x]_{-1}^0 = 1 - \frac{\pi}{4} :$$

$$: \quad J = \int_{-1}^0 \ln(1+x^2) dx : \quad \text{---}$$

$$\begin{cases} u'(x) = \frac{2x}{1+x^2} \\ v(x) = x \end{cases} : \quad \begin{cases} u(x) = \ln(1+x^2) \\ v'(x) = 1 \end{cases}$$

$$J = [x \ln(1+x^2)]_{-1}^0 - 2 \int_{-1}^0 \frac{x^2}{1+x^2} dx :$$

$$J = \ln 2 - 2I = \ln 2 - 2 \left(1 - \frac{\pi}{4}\right) :$$

$$. J = \frac{\pi - 4 + 2 \ln 2}{2} :$$

$$\forall x \in \mathbb{R} : f(x) = (x+2)e^{-x}$$

$$\forall x \in \mathbb{R} : f(x) = xe^{-x} + 2e^{-x} : \quad \text{---(1)}$$

$$\begin{cases} \lim_{x \rightarrow +\infty} xe^{-x} = 0 \\ \lim_{x \rightarrow +\infty} e^{-x} = 0 \end{cases} \Rightarrow \lim_{x \rightarrow +\infty} f(x) = 0 :$$

$$. +\infty \quad (Ox) \quad (C_f)$$

$$: \quad -\infty \quad \text{---}$$

$$\begin{cases} \lim_{x \rightarrow -\infty} (x+2) = -\infty \\ \lim_{x \rightarrow -\infty} e^{-x} = +\infty \end{cases} \Rightarrow \lim_{x \rightarrow -\infty} f(x) = -\infty$$

$$\forall x \in \mathbb{R}^* : \frac{f(x)}{x} = \left(1 + \frac{2}{x}\right)e^{-x} :$$

$$\begin{cases} \lim_{x \rightarrow -\infty} \left(1 + \frac{2}{x}\right) = 1 \\ \lim_{x \rightarrow -\infty} e^{-x} = +\infty \end{cases} \Rightarrow \lim_{x \rightarrow -\infty} \frac{f(x)}{x} = +\infty :$$

$$. (Oy) \quad -\infty \quad (C_f)$$

$$: \quad \mathbb{R} \quad f \quad \text{---(2)}$$

$$: \quad \mathbb{R}$$

$$\forall x \in \mathbb{R} : f'(x) = (x+2)'e^{-x} + (x+2)(e^{-x})'$$

$$f'(x) = e^{-x} - (x+2)e^{-x} :$$

$$\forall x \in \mathbb{R} : f'(x) = -(x+1)e^{-x} :$$

$$\forall x \in \mathbb{R} : sg[f'(x)] = -sg[x+1] :$$

$$] -\infty, -1] \quad f$$

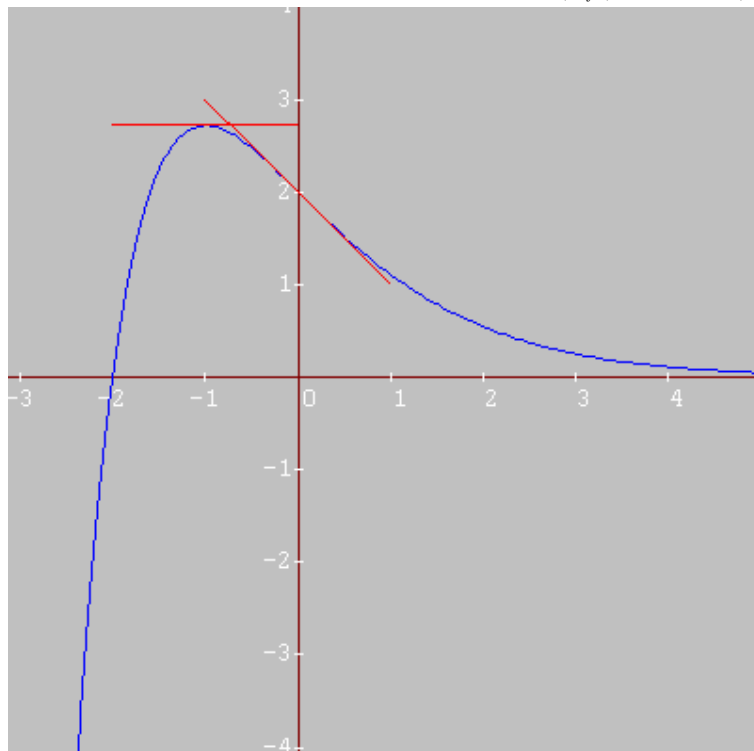
$$(C_f) \quad [-1, +\infty[$$

$$. \quad A(-1, e)$$

$$: f \text{---} -$$

$x$	\$-\infty\$	\$-1\$	\$+\infty\$
$f'(x)$	\$+\$	\$0\$	\$-\$
$f$			

( :01 ) : (C<sub>f</sub>) \_\_\_\_\_ (T) \_\_\_\_\_ - (4)



$$B = \int_{\frac{1}{\sqrt{3}}}^{\sqrt{3}} \frac{1}{t^2} dt = \left[ \frac{-1}{t} \right]_{\frac{1}{\sqrt{3}}}^{\sqrt{3}} :$$

$$\cdot B = -\frac{1}{\sqrt{3}} + \sqrt{3} = \frac{2\sqrt{3}}{3} :$$

$$C = \int_{\frac{1}{2}}^2 \frac{\ln x}{1+x^2} dx : \quad -$$

$$dx = \frac{-1}{y^2} dy : \quad y = \frac{1}{x} :$$

$$C = \int_{\frac{1}{2}}^2 \frac{\ln\left(\frac{1}{y}\right)}{1+\left(\frac{1}{y}\right)^2} \times \frac{-1}{y^2} dy :$$

$$C = \int_{\frac{1}{2}}^2 \frac{\ln y}{1+y^2} dy :$$

$$\cdot C = 0 : \quad C = -C :$$

: \_\_\_\_\_ -

$$\forall a \in ]0, +\infty[ : \int_a^a \frac{\ln x}{1+x^2} dx = 0$$

$$\cdot y = \frac{1}{x} :$$

$$A = \int_{-7}^0 \frac{1}{1+\sqrt[3]{1-x}} dx : \quad - (2)$$

$$\begin{cases} u^3 = 1-x \\ 3u^2 du = -dx \end{cases} : \quad u = \sqrt[3]{1-x} :$$

$$A = \int_2^1 \frac{-3u^2}{1+u} du :$$

$$\frac{-3u^2}{1+u} = -3 \left( u - 1 + \frac{1}{u+1} \right) :$$

$$A = -3 \left[ -u + \frac{u^2}{2} + \ln(1+u) \right]_2^1 :$$

$$A = 3 \left( \frac{1}{2} + \ln 3 - \ln 2 \right) :$$

$$B = \int_{\frac{\pi}{3}}^{\frac{2\pi}{3}} \frac{1}{1-\cos x} dx : \quad -$$

$$\begin{cases} dx = \frac{2}{1+t^2} dt \\ \cos x = \frac{1-t^2}{1+t^2} \end{cases} : \quad t = \tan\left(\frac{x}{2}\right) :$$

$$B = \int_{\frac{1}{\sqrt{3}}}^{\sqrt{3}} \frac{1+t^2}{2t^2} \times \frac{2}{1+t^2} dt :$$

<b>02</b>	<b>2 + 01</b>	<b>2</b>	<b>03</b>	_____
<b>Prof : BENELKHATIR</b>			<b>2006/2005</b>	_____

- (2)

$$h(\alpha) = h(2) + \int_2^\alpha \frac{x-1}{x^2-2x+1} dx$$

$x \mapsto x^2 - 2x$  :  
 $( [2, \alpha ]$

$$h(\alpha) = \frac{\ln 2}{2} + \int_2^\alpha \frac{1}{x-1} dx$$

$$h(\alpha) = \frac{\ln 2}{2} + [\ln(x-1)]_2^\alpha$$

$$h(\alpha) = \frac{\ln 2}{2} + \ln(\alpha-1) = \ln[\sqrt{2}(\alpha-1)]$$

$$V_e = \pi \times \int_2^4 \left( \frac{\sqrt{\ln x}}{x} \right)^2 dx$$

$$V_e = \pi \times \int_2^4 \frac{\ln x}{x^2} dx$$

$$\begin{cases} u'(x) = \frac{1}{x} \\ v(x) = \frac{-1}{x} \end{cases} \quad \begin{cases} u(x) = \ln x \\ v'(x) = \frac{1}{x^2} \end{cases}$$

$$V_e = \pi \times \left( \left[ \frac{-\ln x}{x} \right]_2^4 + \int_2^4 \frac{1}{x^2} dx \right)$$

$$V_e = -\pi \times \left[ \frac{1+\ln x}{x} \right]_2^4 = \frac{\pi}{4}$$

:04 ■

$(E_0)$  - (1)

$$r_2 = -i \quad r_1 = i \quad (1): r^2 + 1 = 0$$

$(E_0)$

$$y : x \mapsto A \cos x + B \sin x \quad (A, B) \in \mathbb{R}^2$$

$(E)$  - (3)

$$z : x \mapsto z(x) = A \cos x + B \sin x + x e^{-x}$$

$(A, B) \in \mathbb{R}^2$

$g$  - (4)

$$A = 1 \quad g(0) = 1$$

$$B = -1 \quad g'(0) = 0$$

$$\forall x \in \mathbb{R} : g(x) = \cos x - \sin x + x e^{-x}$$

$$g(x) = x e^{-x} + \sqrt{2} \cos\left(x + \frac{\pi}{4}\right)$$

- (3)

$$K = \int_{-1}^0 \frac{1}{1-x} dx + \int_0^3 \frac{1}{1+x} dx$$

$$K = [-\ln(1-x)]_{-1}^0 + [\ln(1+x)]_0^3$$

$$K = \ln 2 + \ln 4 = 3 \ln 2$$

$\forall x \in ]0, +\infty[ : \frac{1 - \ln \sqrt[3]{x}}{x} = \frac{1}{x} - \frac{1}{3} \left( \frac{1}{x} \times \ln x \right)$

$$L = \int_1^e \frac{1}{x} dx - \frac{1}{3} \int_1^e (\ln x)' \ln x dx$$

$$L = \left[ (\ln x) - \frac{1}{6} (\ln x)^2 \right]_1^e = 1 - \frac{1}{6} = \frac{5}{6}$$

$$M = \int_0^{2\pi} (\pi - |2x - \pi|) \sin x dx$$

$$\int_0^{\frac{\pi}{2}} (\pi - |2x - \pi|) \sin x dx = 2 \int_0^{\frac{\pi}{2}} x \sin x dx$$

$$= 2 \left[ -x \cos x \right]_0^{\frac{\pi}{2}} + 2 \int_0^{\frac{\pi}{2}} \cos x dx$$

$$= 0 + 2 \left[ \sin x \right]_0^{\frac{\pi}{2}} = 2$$

$$\int_{\frac{\pi}{2}}^{2\pi} (\pi - |2x - \pi|) \sin x dx = 2 \int_{\frac{\pi}{2}}^{2\pi} (\pi - x) \sin x dx$$

$$= 2\pi \int_{\frac{\pi}{2}}^{2\pi} \sin x dx - 2 \int_{\frac{\pi}{2}}^{2\pi} x \sin x dx$$

$$= 2\pi \left[ -\cos x \right]_{\frac{\pi}{2}}^{2\pi} - 2 \left[ -x \cos x - \sin x \right]_{\frac{\pi}{2}}^{2\pi}$$

$$= -2\pi + 4\pi + 2 = 2\pi + 2$$

$$M = \int_0^{2\pi} (\pi - |2x - \pi|) \sin x dx = 2\pi + 4$$

:03 ■

$h(2)$  - (1)

$$h(2) = \int_1^2 \frac{x-1}{-x^2+2x+1} dx$$

$x \mapsto x^2 - 2x$

$$h(2) = -\frac{1}{2} \int_1^2 \frac{(x^2 - 2x - 1)'}{x^2 - 2x - 1} dx$$

$$h(2) = -\frac{1}{2} \left[ \ln |x^2 - 2x - 1| \right]_1^2$$

$$h(2) = -\frac{1}{2} (0 - \ln 2) = \frac{\ln 2}{2}$$