TE 7.

EXERCICE 1

$f_m(x) = (x-m)e^{-x}$

a) • $f_m(x) = 0 \Leftrightarrow x = m$

• $\lim\limits_{x\to+\infty} \dfrac{x-m}{e^x} = 0$

$\lim\limits_{x\to-\infty} \dfrac{x-m}{e^x} = -\infty$

$\underset{0}{e^x}$

• $f'(x) = e^{-x} + (x-m)e^{-x} = e^{-x}(1-x+m) = 0 \Leftrightarrow$

$\Leftrightarrow 1-x+m = 0 \Leftrightarrow x = 1+m$

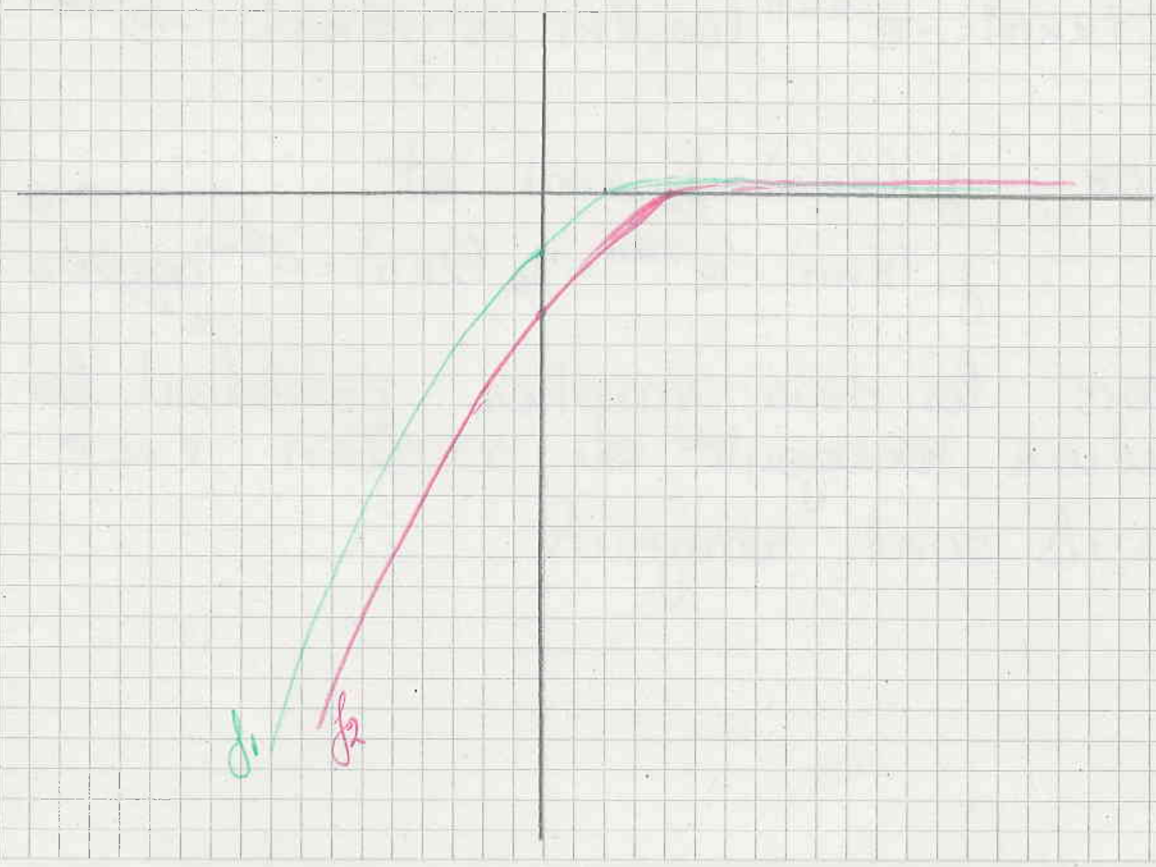
• $f''(x) = -e^{-x}(1-x+m) + e^{-x}(-1) =$

$= e^{-x}(-1+x-m-1) = e^{-x}(x-m-2) = 0 \Leftrightarrow$

$\Leftrightarrow x = m+2$

b) $f_1 = (x-1)e^{-x}$ $\quad$ $f_2(x) = (x-2)e^{-x}$

$\cap Oy$ $\quad f_1(0) = -1 \quad f_2(0) = -2$



b) $f'_m(x) = 0 \Leftrightarrow x = 1+m$

$$\left.\begin{array}{l} \\ y = (1+m-m)e^{-1-m} = e^{-(1+m)} \end{array}\right\} \Rightarrow \underline{y = e^{-x}}$$

d) $J_m(m; 0)$

$f'_m(m) = 1 \Leftrightarrow e^{-m}(1-m+m) = 1 \Leftrightarrow e^{-m} = 1 \Leftrightarrow e^{m} = 1$

$\Leftrightarrow \underline{m = 0}$

EXERCICE 2

$f_1(x) = e^{-x} \quad f_2(x) = e^{-x} \cdot \cos(x)$

a) $f_1(x) = f_2(x) \Leftrightarrow e^{-x} = e^{-x}\cos(x) \Leftrightarrow \cos x = 1 \Leftrightarrow$

$x = 2k\pi \quad k \in \mathbb{Z}$

b) $f_1'(x) = -e^{-x} \qquad f_2'(x) = -e^{-x}\cos x - e^{-x}\sin x =$

$= -e^{-x}(\cos x + \sin x)$

$f_1'(2k\pi) = -e^{-2k\pi}$

$f_2'(2k\pi) = -e^{-2k\pi}(\underbrace{\cos 2k\pi}_{1} + \underbrace{\sin 2k\pi}_{0}) = -e^{-2k\pi}$

Donc $\quad f_1'(2k\pi) = f_2'(2k\pi) \quad$ et

$f_1(2k\pi) = e^{-2k\pi} = f_2(2k\pi) = e^{-2k\pi}\underbrace{\cos 2k\pi}_{1}$

Alors les deux graphes possèdent la même tangente en $x = 2k\pi \quad \forall k \in \mathbb{Z}$

$\Rightarrow$ ils sont tangents