Ex 69

$f(x) = x e^{-2x} = uv$ avec $u = x$ et $v = e^{-2x}$

$u' = 1$ $\quad v' = -2e^{-2x}$

$f'(x) = u'v + uv' = e^{-2x} + x\left(-2e^{-2x}\right) = e^{-2x} - 2xe^{-2x} = e^{-2x}\left(1-2x\right)$

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$g(x) = (x+1)e^{-x} = uv$ avec $u = x+1$ et $v = e^{-x}$

$u' = 1$ $\quad v' = -e^{-x}$

$g'(x) = u'v + uv' = e^{-x} + (x+1)\left(-e^{-x}\right) = e^{-x} - (x+1)e^{-x} = e^{-x}\left[1-(x+1)\right] =$

$= e^{-x}\left(1-x-1\right) = -xe^{-x}$

Ex 70

$f(x) = e^{-x^2/2} = e^{u}$ avec $u = -\frac{x^2}{2} \Rightarrow u' = -\frac{2x}{2} = -x$

$f'(x) = e^{u}u' = e^{-x^2/2}(-x) = -x e^{-x^2/2}$

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$g(x) = \ln(x^2+1) = \ln(u)$ avec $u = x^2+1 \Rightarrow u' = 2x$

$g'(x) = \frac{u'}{u} = \frac{2x}{x^2+1}$

Ex 73

$f(x) = e^{-2x+1} + 2\ln x = e^{u} + 2\ln x$ avec $u = -2x+1 \Rightarrow u' = -2$

$f'(x) = e^{u}u' + \frac{2}{x} = -2e^{-2x+1} + \frac{2}{x}$

Ex 74

$f(x) = \frac{e^x+1}{e^x-1} = \frac{u}{v}$ avec $u = e^x+1$ et $v = e^x-1$

$u' = e^x$ $\quad v' = e^x$

$f'(x) = \frac{u'v-uv'}{v^2} = \frac{e^x(e^x-1)-(e^x+1)e^x}{(e^x-1)^2} = \frac{\cancel{e^{2x}} - e^x - \cancel{e^{2x}} - e^x}{(e^x-1)^2} = -\frac{2e^x}{(e^x-1)^2}$