❶ Calculez les dérivées des fonctions suivantes :

1.1)	$\left[\sin(2x)\right]' = 2\cdot\cos(2x)$	***1.2)***	$\left[\cos\left(\frac{x}{3}\right)\right]' = -\frac{1}{3}\cdot\sin\left(\frac{x}{3}\right)$
1.3)	$\left[\sin\left(1+x^2\right)\right]' = 2x\cdot\cos\left(1+x^2\right)$	***1.4)***	$\left[\tan(3x)\right]' = \underline{\underline{\frac{3}{\cos^2(3x)}}} = \underline{\underline{3\cdot\left(1+\tan^2(3x)\right)}}$

1.5)	$\left[\sin^3(4x)\right]' = 3\cdot\sin^2(4x)\cdot\cos(4x)\cdot 4 = 12\cdot\sin^2(4x)\cdot\cos(4x)$
1.6)	$\left[3\cdot\cos\left(x^2-1\right)\right]' = 3\cdot\left[-\sin\left(x^2-1\right)\right]\cdot 2x = -6x\cdot\sin\left(x^2-1\right)$
1.7)	$\left[\sqrt{2x+1}\right]' = \left[(2x+1)^{\frac{1}{2}}\right]' = \frac{1}{2}\cdot(2x+1)^{-\frac{1}{2}}\cdot 2 = \frac{1}{\sqrt{2x+1}}$
1.8)	$\left[3\cdot\sqrt{x^2+4x-5}\right]' = 3\cdot\left[\left(x^2+4x-5\right)^{\frac{1}{2}}\right]' = 3\cdot\frac{1}{2}\cdot\left(x^2+4x-5\right)^{\frac{-1}{2}}\cdot(2x+4) = \frac{3\cdot 2\cdot(x+2)}{2}\cdot\frac{1}{\sqrt{x^2+4x-5}}$ $= \frac{3\cdot(x+2)}{\sqrt{x^2+4x-5}}$
1.9)	$\left[\frac{1}{\sqrt{3x^2-1}}\right]' = \left[\left(3x^2-1\right)^{\frac{-1}{2}}\right]' = \frac{-1}{2}\cdot\left(3x^2-1\right)^{\frac{-3}{2}}\cdot 6x = \underline{\underline{\frac{-3x}{\sqrt{\left(3x^2-1\right)^3}}}} = \underline{\underline{\frac{-3x}{\left(3x^2-1\right)\cdot\sqrt{\left(3x^2-1\right)}}}}$
1.10)	$\left[\frac{8}{\sqrt{8x^2+2}}\right]' = 8\cdot\left[\left(8x^2+2\right)^{\frac{-1}{2}}\right]' = 8\cdot\frac{-1}{2}\cdot\left(8x^2+2\right)^{\frac{-3}{2}}\cdot 16x = -64x\cdot\frac{1}{\sqrt{\left(8x^2+2\right)^3}} =$ $\frac{-64x}{\left(8x^2+2\right)\cdot\sqrt{\left(8x^2+2\right)}} = \frac{-32x}{\left(4x^2+1\right)\cdot\sqrt{\left(8x^2+2\right)}}$
1.11)	$\left[\sqrt{\sin(x)}\right]' = \left[\sin^{\frac{1}{2}}(x)\right]' = \frac{1}{2}\cdot\sin^{\frac{-1}{2}}(x)\cdot\cos(x) = \frac{\cos(x)}{2\cdot\sqrt{\sin(x)}}$
1.12)	$\left[\sqrt{\sin(2x)}\right]' = \left[\sin^{\frac{1}{2}}(2x)\right]' = \frac{1}{2}\cdot\sin^{\frac{-1}{2}}(2x)\cdot\cos(2x)\cdot 2 = \frac{\cos(2x)}{\sqrt{\sin(2x)}}$
1.13)	$\left[\cos\left(\frac{x}{1+x}\right)\right]' = \left[-\sin\left(\frac{x}{1+x}\right)\right].\frac{1\cdot(1+x)-x\cdot 1}{(1+x)^2} = \frac{-\sin\left(\frac{x}{1+x}\right)}{(1+x)^2}$
1.14)	$\left[\tan\left(\sqrt{x+1}\right)\right]' = \frac{1}{\cos^2\left(\sqrt{x+1}\right)}\cdot\left(\sqrt{x+1}\right)' = \frac{1}{\cos^2\left(\sqrt{x+1}\right)}\cdot\frac{1}{2\cdot\sqrt{x+1}}\cdot(x+1)' = \frac{1}{2\cdot\sqrt{x+1}\cdot\cos^2\left(\sqrt{x+1}\right)}$

❷ Calculez les dérivées des fonctions suivantes :

2.1)	$\left[e^{3x+2}\right]' = e^{3x+2}\cdot(3x+2)' = 3\cdot e^{3x+2}$	***2.2)***	$\left[e^{x^2}\right]' = e^{x^2}\cdot(x^2)' = 2x\cdot e^{x^2}$
2.3)	$\left[e^{\cos(x)}\right]' = e^{\cos(x)}\cdot(\cos(x))' = -\sin(x)\cdot e^{\cos(x)}$	***2.4)***	$\left[x\cdot e^{x}\right]' = 1\cdot e^x + x\cdot e^x = (x+1)\cdot e^x$

2.5)	$\left[x\cdot e^{x^2+3x}\right]' = 1\cdot e^{x^2+3x} + x\cdot e^{x^2+3x}\cdot(2x+3) = (2x^2+3x+1)\cdot e^{x^2+3x}$
2.6)	$\left[\cos(x)\cdot e^{x}\right]' = -\sin(x)\cdot e^x + \cos(x)\cdot e^x = \left(-\sin(x)+\cos(x)\right)\cdot e^x$
2.7)	$\left[\sin(x)\cdot e^{x^2}\right]' = \cos(x)\cdot e^{x^2} + \sin(x)\cdot e^{x^2}\cdot 2x = \left(\cos(x)+2x\cdot\sin(x)\right)\cdot e^{x^2}$
2.8)	$\left[\sin^2(x)\cdot e^{3x}\right]' = 2\cdot\sin(x)\cdot\cos(x)\cdot e^{3x} + \sin^2(x)\cdot e^{3x}\cdot 3 = \left(2\cdot\cos(x)+3\sin(x)\right)\cdot\sin(x)\cdot e^{3x}$

❸ Calculez les dérivées des fonctions suivantes :

3.1)	$\left[\ln(3x+2)\right]' = \frac{1}{3x+2}\cdot(3x+2)' = \frac{3}{3x+2}$	***3.2)***	$\left[\ln(x^2)\right]' = \frac{1}{x^2}\cdot\left(x^2\right)' = \frac{2x}{x^2} = \frac{2}{x}$ Quelle propriété des logarithmes est en jeu ?
3.3)	$\left[\ln(1-x^3)\right]' = \frac{1}{1-x^3}\cdot\left(1-x^3\right)' = \frac{-3x^2}{1-x^3}$	***3.4)***	$\left[x\cdot\ln(x)\right]' = 1\cdot\ln(x) + x\cdot\frac{1}{x} = \ln(x)+1$
3.5)	$\left[x^2\cdot\ln(x)\right]' = 2x\cdot\ln(x) + x^2\cdot\frac{1}{x} = x\cdot\left(2\ln(x)+1\right)$	***3.6)***	$\left[x\cdot\ln(x^2)\right]' = 1\cdot\ln(x^2) + x\cdot\frac{1}{x^2}\cdot 2x = \ln(x^2)+2$
3.7)	$\left[\ln(1+e^x)\right]' = \frac{1}{1+e^x}\cdot e^x = \frac{e^x}{1+e^x}$	***3.8)***	$\left[\ln\left(\frac{1}{x}\right)\right]' = \frac{1}{\frac{1}{x}}\cdot\frac{-1}{x^2} = x\cdot\frac{-1}{x^2} = \frac{-1}{x}$ Quelle propriété des logarithmes est en jeu ?

3.9)	$\left[\ln\left(\cos^2(x)+1\right)\right]' = \frac{1}{\cos^2(x)+1}\cdot 2\cdot\cos(x)\cdot\left(-\sin(x)\right) = \frac{-2\cdot\sin(x)\cdot\cos(x)}{\cos^2(x)+1}$
3.10)	$\left[\ln\left(\frac{1}{1+x^2}\right)\right]' = \frac{1}{\frac{1}{1+x^2}}\cdot\left[\left(1+x^2\right)^{-1}\right]' = \frac{1+x^2}{1}\cdot(-1)\cdot\left(1+x^2\right)^{-2}\cdot 2x = \frac{-2x\cdot\left(1+x^2\right)}{\left(1+x^2\right)^2} = \frac{-2x}{1+x^2}$ Autre manière : $\left[\ln\left(\frac{1}{1+x^2}\right)\right]' = \left[-\ln\left(1+x^2\right)\right]' = -\frac{1}{1+x^2}\cdot\left(1+x^2\right)' = \frac{-2x}{1+x^2}$