Classe: TS2ET	Date: 1/12/2017	**Type**
Devoir n°4		**Devoir surveillé**
Thème: Transformée de Laplace.		

Pour chaque cas, déterminer l'originale de la fonction proposée.

1) $F(p)=\frac{1}{p}+\frac{3}{p^2}$

2) $F(p)=\frac{2}{p}+\frac{3}{p+1}$

3) $F(p)=\frac{1}{p}e^{-2p}$

4) $F(p)=\frac{2}{p}-\frac{3}{2p^2}+\frac{2}{p^2+4}$

5) $F(p)=\frac{6}{p^2+9}$

6) $F(p)=\frac{3p}{p^2+25}$

7) $F(p)=\frac{1}{(p+3)^2}$

8) $F(p)=\frac{p+2}{(p+2)^2+36}$

9) $F(p)=\frac{p+1}{p^2+2p+5}$

10) $F(p)=\frac{p}{(p+1)^2+4}$

Correction

1°) $F(p) = \frac{1}{p} + \frac{3}{p^2}$ donc $f(t) = \mathcal{U}(t) + 3t\,\mathcal{U}(t) = (1+3t)\,\mathcal{U}(t)$

2°) $F(p) = \frac{2}{p} + \frac{3}{p+1}$ donc $f(t) = 2\,\mathcal{U}(t) + 3e^{-t}\,\mathcal{U}(t) = (2+3e^{-t})\,\mathcal{U}(t)$

3°) $F(p) = \frac{1}{p}e^{-2p}$ donc $f(t) = \mathcal{U}(t-2)$

4°) $F(p) = \frac{2}{p} - \frac{3}{2} \times \frac{1}{p^2} + \frac{2}{p^2+4}$ donc $f(t) = 2\,\mathcal{U}(t) - \frac{3}{2}t\,\mathcal{U}(t) + \sin(2t)\,\mathcal{U}(t)$

$$f(t) = \left(2 - \frac{3}{2}t + \sin(2t)\right)\mathcal{U}(t)$$

5°) $F(p) = \frac{6}{p^2+9} = 2 \times \frac{3}{p^2+9}$ donc $f(t) = 2\sin(3t)\,\mathcal{U}(t)$

6°) $F(p) = \frac{3p}{p^2+25} = 3\frac{p}{p^2+25}$ donc $f(t) = 3\cos(5t)\,\mathcal{U}(t)$

7°) $F(p) = \frac{1}{(p+3)^2}$ donc $f(t) = t\,\mathcal{U}(t).e^{-3t} = te^{-3t}\,\mathcal{U}(t)$

8°) $F(p) = \frac{p+2}{(p+2)^2+36}$ donc $f(t) = \cos(6t).e^{-2t}\,\mathcal{U}(t)$

9°) $F(p) = \frac{p+1}{p^2+2p+5} = \frac{p+1}{(p+1)^2+4}$ donc $f(t) = \cos(2t)e^{-t}\,\mathcal{U}(t)$

10°) $F(p) = \frac{p}{(p+1)^2+4} = \frac{p+1-1}{(p+1)^2+4} = \frac{p+1}{(p+1)^2+4} - \frac{1}{(p+1)^2+4} = \frac{p+1}{(p+1)^2+4} - \frac{1}{2}\frac{2}{(p+1)^2+4}$

donc $f(t) = \cos(2t)e^{-t}\,\mathcal{U}(t) - \frac{1}{2}\sin(2t)e^{-t}\,\mathcal{U}(t)$

$$f(t) = \left(\cos(2t) - \frac{1}{2}\sin(2t)\right)e^{-t}\,\mathcal{U}(t)$$