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## Fiche d'exercices 2.

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**Exercice 1.**

Décomposer en éléments simples sur  $\mathbb{R}$  les fractions rationnelles suivantes :

$$F_1 = \frac{X^2 + 3X + 5}{X^2 + X - 2}$$

$$G_1 = \frac{X^4 + 1}{(X + 1)(X + 2)}$$

$$H_1 = \frac{X^2}{(X - 1)(X - 2)(X - 3)}$$

$$F_2 = \frac{X}{(X - 1)^3(X - 2)}$$

$$G_2 = \frac{2X + 1}{(X^2 - 1)^3}$$

$$H_2 = \frac{X^4 + X^3 + 1}{X^3 + 1}$$

$$F_3 = \frac{X^3}{(X^2 + 1)(X^2 + X + 1)}$$

$$G_3 = \frac{X^3 + X + 3}{(X^2 + X + 1)^2}$$

$$H_3 = \frac{3X + 2}{(X + 1)^2(X^2 + 2X + 5)}$$

$$F_4 = \frac{5X + 1}{(X + 1)^3(X^2 + 2X + 2)}$$

$$G_4 = \frac{X^2}{X^4 + 1}$$

$$H_4 = \frac{X}{X^4 + 1}$$

$$F_5 = \frac{1}{X^6 + 1}$$

$$G_5 = \frac{X}{X^5 - X^4 + X^3 - X^2 + X - 1}$$

$$H_5 = \frac{X^2 + 1}{(X - 1)^3(X^2 - X + 1)^3}$$

$$F_6 = \frac{1}{(X^2 - 1)(X^2 + X + 1)(X^2 + X + 2)}$$

$$G_6 = \frac{1}{X^{2n} - 1}$$

$$H_6 = \frac{1}{X^n - 1}$$

$$F_7 = \frac{X^2}{X^4 - 2X^2 \cos(2\alpha) + 1}, \quad \alpha \in \mathbb{R}$$

$$G_7 = \frac{X^3}{X^3 - 1}$$

$$H_7 = \frac{X^2 + X + 1}{(X - 1)^2(X + 1)^2}$$

$$F_8 = \frac{3X^5 + 2X^4 + X^2 + 3X + 2}{X^4 + 1}$$

$$G_8 = \frac{X^3 + X}{(X^2 + X + 1)^2}$$

$$H_8 = \frac{X^7 + 1}{(X^2 + 1)(X^2 + X + 1)}$$