

Exercices TD1

Arthur Garnier

1 Exercice 1

$$F = \mathbb{F}(10, 4, -4, 4)$$

1.1

$$M = 9,99910^4 = 99990$$

$$m = 1,00010^{-4}$$

$$u = 0,00110^{-4} = 10^{-7}$$

1.2

1. $fl(1,0015) = 1,002$
2. $fl(1,23410^{-3}) = 1,23410^{-3}$
3. $fl(1,23410^{-5}) = fl(0,123410^{-4}) = 0,12310^{-4}$
4. $fl(1,23410^5) = Inf$
5. $fl(9,999510^4) = 10^5 = Inf$
6. $fl(9,9994910^4) = 9,99910^4$

2 Exercice 2

$$u \odot v = fl(u \cdot v)$$

2.1

$$u = \frac{1}{2}\beta^{1-p} = \frac{1}{2}10^{-7} = 0,510^{-7}$$

2.2

$$(11111113 \oplus -11111111) \oplus 7,51111111 = 2 \oplus 7,51111111 = 9,51111111$$

$$11111113 \oplus (-11111111 \oplus 7,51111111) = 11111113 \oplus -11111103 = 10$$

3 Exercice 5

3.1 2

$$x_1 \oplus x_2 = fl(x_1 + x_2)$$

$$x_1 \oplus x_2 = (x_1 + x_2)(1 + \varepsilon_1) \text{ où } |\varepsilon_1| \leq \mathbf{u}$$

$$\begin{aligned} (x_1 \oplus x_2) \oplus x_3 &= ((x_1 \oplus x_2) + x_3)(1 + \varepsilon_2) \text{ avec } |\varepsilon_2| \leq \mathbf{u} \\ &= ((x_1 + x_2)(1 + \varepsilon_1) + x_3)(1 + \varepsilon_2) \end{aligned}$$

$$\text{On pose : } w = (x_1 \oplus x_2) \oplus x_3$$

$$((x_1 \oplus x_2) \oplus x_3) \oplus x_4 = (w + x_4)(1 + \varepsilon_3) \text{ avec } |\varepsilon_3| \leq \mathbf{u}$$