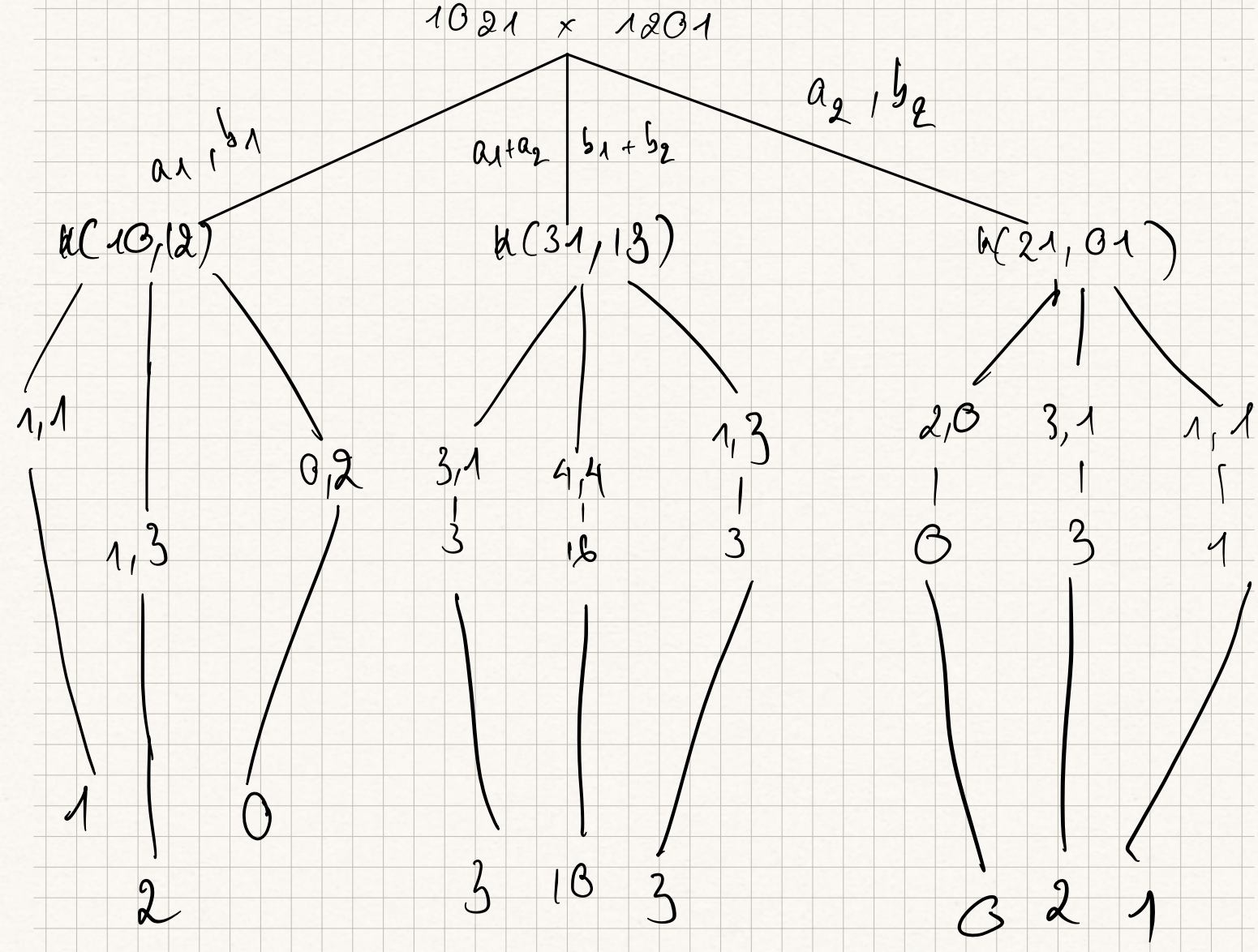

$1 \times 100 + 2 \times 10 + 0 \times 1 = 120$

$3 \times 100 + 10 \times 10 + 3 \times 1 = 403$

$0 \times 100 + 2 \times 10 + 1 \times 1 = 21$

$$120 \cdot 10000 + (403 - 120 - 21) \cdot 100 + 21$$

$$= 120 \cdot 10000 + 262 \cdot 100 + 21$$

$$= 1226221$$

Ex 2

1	$f(n) = 3(n^2-1)^2$	$\in \Theta(n^4)$	$g(n) = 4n^3 + 5n$	$\in \Theta(n^3)$
2	$f(n) = \log(3(n^2-1)^2)$	$\in \Theta(\log n)$	$g(n) = \log(4n^3 + 5n)$	$\in \Theta(\log n)$
3	$f(n) = \log(4n^3)$	$\in \Theta(\log n)$	$g(n) = 4(\log n)^3$	$\in \Theta((\log n)^3)$
4	$f(n) = 4n^3$	polynôme	$g(n) = 3^{(4n)}$	exponentielle
5	$f(n) = 3^{(n+4)}$	$= 81 \cdot 3^n$	$g(n) = 3^{(4n)}$	$= 81^n$
6	$f(n) = 3^{(n+4)}$	$= 81 \cdot 3^n$	$g(n) = 3^n$	
7	$f(n) = \log(n^4)$	$= 4 \log n$	$g(n) = \sqrt[3]{n}$	$= n^{1/3}$
8	$f(n) = \log(4^n)$	$= 2n$	$g(n) = \sqrt[3]{n}$	$= n^{1/3}$

	$f \in \Omega(g)$	$f \in O(g)$	$f \in \Theta(g)$
1	✓	✗	✗
2	✓	✓	✓
3	✗	✓	✗
4	✗	✓	✗
5	✗	✓	✗
6	✓	✓	✓
7	✗	✓	✗
8	✓	✗	✗

Ex 3

```
def foo_1_(T):
    return 0 if len(T) == 0 else foo_1_(T[3:]) + 3
```

$$A_1(n) = \begin{cases} 0 \text{ si } n = 0 & \text{si } n = 0 \\ 1 & \text{si } n = 1 \text{ ou } 2 \\ A_2(n-3) + 1 \text{ si } n > 2 & \\ & +1 \text{ n}^0 \leftarrow c \end{cases}$$

$$\Rightarrow A_1(n) = a\,A\left(\frac{n}{b}\right) + \Theta(n^c)$$

$a = 1$

$b = 1$

$c = 0$

$\log_{(3)}(1) = 0$

$\Leftrightarrow (3)^x = 1$

Master Théorème :

$A(n) = a\,A\left(\frac{n}{b}\right) + \Theta(n^c)$

$$A(n) = \Theta \begin{cases} \Theta(n^c) \text{ si } c > \log_b a \\ \Theta(n^{\log_b(a)} \log n) \text{ si } c = \log a \\ \Theta(n^{\log_b(a)}) \text{ si } c < \log_b(a) \end{cases}$$

$A_1(n) = \left[\frac{n}{3}\right] \in \Theta(n)$?

```
def foo 2 (T)
  return 0 if len(T) == 0 else
      sum( e for e in T) + foo_2_(T[2:])
```

$$A_2(n) \begin{cases} 0 & \text{si } n = 0 \\ 1 & \text{si } n = 1 \\ A_2(n-2) + n & \text{si } n > 0 \end{cases}$$

$$A(n) = aA\left(\frac{n}{b}\right) + \Theta(n^c)$$

$a = 1$
$b = 2$
$c = 1$

$\log_{(a)}(1) = 0$??

$A_1(n) \in \Theta(n^2)$.

```
def foo3(T)
  return 0 if len(T) == 0 else
      foo3(T[:len(T)//2]) + 1
```

$$A_3(n) = \begin{cases} 0 & \text{si } n = 0 \\ A_3\left(\frac{n}{2}\right) + 1 & ? \; 2 \end{cases}$$

$a = 1$
$b = 2$
$c = 0$

$$\log_2(1) = 0$$

$$\Theta(n^{\log_b(a)} \log n) \qquad A_3 \in \Theta(\log n)$$

$$\Theta(n^{\log_2(1)} \log(n))$$

$$\Theta = (n^0 \log(n)$$
$$= \log(n)$$

Esp4

```
def F(n):
    return 1 if n<4 else 2 * F(n-1) + F(n-4)
```

$$C(n) = \begin{cases} 0 & \text{se } n < 4 \\ C(n-1) + C(n-4) + 2 \end{cases}$$