

Ejercicio a)

① $a = 412$ $b = 260$

$r = a \bmod b$

$\text{if } (r == 0)$

$\text{return } b$

$a = b;$

$b = r$

	r	a	b
1	152	412	260
2	108	260	152
3	44	152	108
4	20	108	44
5	4	44	20
6	0	20	4

② $a = 412$ $b = 260$

$r_1 \rightarrow r = a \bmod b$

$\text{if } (r == 0)$

$\text{return } b$

$r_2 \rightarrow \text{if } (r > b/2)$

$r = b - r$

$a = b$

$b = r$

	a	b	r ₁	$\text{if } > b/2$	r ₂
1	412	260	152	130	108
2	260	108	44	54	—
3	108	44	20	22	—
4	44	20	4	10	—
5	20	4	0		

$\text{mcd } 4$

$\rightarrow \text{Sale}$

③ $a = 412$ $b = 260$

$\text{Euclides mcd}(a, b)$

{ $\text{if } (b == 0)$

$\text{return } a$

$\text{return Euclides mcd}(b, a \bmod b)$

}

	a	b
1	412	260
2	260	152
3	152	108
4	108	44
5	44	20
6	20	4
7	4	0

$\text{mcd } 4$

$\rightarrow \text{sale}$

4 $a = 412$ $b = 260$

Binary - Gcd (a, b)

- 1 • if ($|b| > |a|$)
return Binary-Gcd(b, a)
- 2 • if ($b == 0$)
return a
- 3 • if ($(a \bmod 2) == 0 \ \&\& \ (b \bmod 2) == 0$)
return $2 \times \text{Binary-Gcd}(\frac{a}{2}, \frac{b}{2})$
- 4 • if ($(a \bmod 2) == 0 \ \&\& \ (b \bmod 2) == 1$)
return Binary-Gcd($\frac{a}{2}, b$)
- 5 • if ($(a \bmod 2) == 1 \ \&\& \ (b \bmod 2) == 0$)
return Binary-Gcd($a, \frac{b}{2}$)
- 6 • return Binary-Gcd($(|a| - |b|) / 2, b$)

	a	b	if	return
1	412	260	3	$2 \times \text{Binary-Gcd}(206, 130) \rightarrow 2 \times 2 = \boxed{4}$
2	206	130	3	$2 \times \text{Binary-Gcd}(103, 65) \rightarrow 2 \times 1 = 2$
3	103	65	6	Binary-Gcd(19, 65)
4	19	65	1	Binary-Gcd(65, 19)
5	65	19	6	Binary-Gcd(23, 19)
6	23	19	6	Binary-Gcd(2, 19)
7	2	19	1	Binary-Gcd(19, 2)
8	19	2	5	Binary-Gcd(19, 1)
9	19	1	6	Binary-Gcd(9, 1)
10	9	1	6	Binary-Gcd(4, 1)
11	4	1	4	Binary-Gcd(2, 1)
12	2	1	4	Binary-Gcd(1, 1)
13	1	1	6	Binary-Gcd(0, 1)
14	0	1	1	Binary-Gcd(0, 0)
15	1	0	2	$a = 1$

5- $x = 412$ $y = 260$

$g = 1$

1 while ($x \% 2 == 0$ & $y \% 2 == 0$)

```
{
  x = x / 2;
  y = y / 2;
  g = 2 * g;
}
```

2 while ($x \neq 0$)

2.1 while ($x \% 2 == 0$)

$x = x / 2;$

2.2 while ($y \% 2 == 0$)

$y = y / 2;$

2.3 $t = |x - y| / 2$

2.4 if ($x \geq y$)

$x = t$

else $y = t$

}

return $g * y$

	x	y	g	Entrada	a	x	y	g
1	412	260	1	1		206	130	2
2	206	130	2	1		103	65	4
3	103	65	4	2				
				↳	Entrada a	x	y	
				-	2.3	19	103	65
				-	2.4 if	19	19	65
4	19	65	4	2				
				↳	Entrada a	x	y	
				-	2.3	23	19	65
				-	2.4 else	23	19	23
5	19	23	4	2	↳	Entrada a	x	y
				-	2.3	2	19	23
				-	2.4 else	2	19	2

	x	y	g	Entra a
6	19	2	4	2

	Entrada	x	y
- 2.2	2	19	1
- 2.3	9	19	1
- 2.4 id	9	9	1

	x	y	g	Entra a
7	9	1	4	2

	Entrada	x	y
- 2.3	4	9	1
- 2.4 id	4	4	1

	x	y	g	Entra a
8	4	1	4	2

	Entrada	x	y
- 2.1	4	2	1
- 2.1	4	1	1
- 2.3	0	1	1
- 2.4 id	0	0	1

↳ Sale

9 return (g.y) = 4.1 = 4;

6

GCD(a, b)

```

while (a != b)
{
    if (a > b)
        a -= b;
    else
        b = b - a;
}
return a;

```

	a	b
1	412	260
2	152	260
3	152	108
4	44	108
5	44	64
6	44	20
7	24	20
8	4	20
9	4	16
10	4	12
11	4	8
12	4	4

→ sale

return a = 4

7

MCD (int a, int b)

{

if (b == 0)

return a

MCD(b, a mod b)

}

	a	b	r
1	412	260	152
2	260	152	108
3	152	108	44
4	108	44	20
5	44	20	4
6	20	4	0
7	4	0	

LP

