Sebastian Paz Rocha / CCOMP 3-1.2

Algoritmo 1

$a = 412$ $b = 260$

$$\begin{array}{c|c} 412 & 260 \\ 260 & 1 \end{array}$$

$r = 152$

$a = 260$ $b = 152$

$$\begin{array}{c|c} 260 & 152 \\ 152 & 1 \end{array}$$

$r = 108$

$a = 152$ $b = 108$

$$\begin{array}{c|c} 152 & 108 \\ 108 & 1 \end{array}$$

$r = 44$

$a = 108$ $b = 44$

$$\begin{array}{c|c} 108 & 44 \\ 88 & 2 \end{array}$$

$r = 20$

$a = 44$ $b = 20$

$$\begin{array}{c|c} 44 & 20 \\ 40 & 2 \end{array}$$

$r = 4$

$a = 20$ $\boxed{b = 4}$

$$\begin{array}{c|c} 20 & 4 \\ 20 & 5 \end{array}$$

$r = 0$ $MCD(412, 260) = 4$

Algoritmo 2

$a = 412 \qquad b = 260$

$$\begin{array}{r|l} 412 & 260 \\ \hline r = 152 & 1 \end{array}$$

$152 > 130 \quad \overset{V}{\longrightarrow} \quad r = 260 - 152$

$r = 260 - 152 = \boxed{108}$

$a = 260 \qquad b = 108$

$$\begin{array}{r|l} 260 & 108 \\ \hline r = 44 & 2 \end{array}$$

$44 > 54 \quad \overset{F}{\longrightarrow} \quad r = 108 - 44$

$a = 108 \qquad r = 44$

$$\begin{array}{r|l} 108 & 44 \\ \hline r = 20 & 2 \end{array}$$

$20 > 22 \quad \overset{F}{\longrightarrow} \quad r = 44 - 20$

$a = 44 \qquad b = 20$

$$\begin{array}{r|l} 44 & 20 \\ \hline r = 4 & 2 \end{array}$$

$4 > 10 \quad \overset{F}{\longrightarrow} \quad r = 20 - 4$

$a = 20 \qquad \boxed{b = 4}$

$$\begin{array}{r|l} 20 & 4 \\ \hline r = 0 & 5 \end{array}$$

$MCD(412, 260) = \underline{4}\,,,$

Algoritmo 3.

Euclides mcd (412, 260)

if (260 == 0)
    Return 412 ✗
Return Euclides mcd (260, 412 mod 260)

Euclides mcd (260, 152)

if (152 == 0)
    Return 260 ✗
Return Euclides mcd (152, 260 mod 152)

Euclides mcd (152, 108)

if (108 == 0)
    Return 152 ✗
Return Euclides mcd (108, 152 mod 108)

Euclides mcd (108, 44)

if (44 == 0) ✗
    Return 108
Return Euclides mcd (44, 108 mod 44)

Euclides mcd (44, 20)

if (20 == 0) ✗
    Return 44
Return Euclides mcd (20, 44 mod 20)

Euclides mcd (20, 4)

if (4 == 0) ✗
    Return 20
Return Euclides mcd (4, 20 mod 4)

MCD (412, 260) = 4

Euclides mcd (4, 0)

if (0 == 0)
    Return 4 ✓
Return Euclides mcd (0, 4 mod 0) ✗

Algoritmo 4

1° if $(|b| > |a|)$
   return Binarygcd(b,a)

2° if $(b == 0)$
   return a.

3° if $((a \bmod 2) == 0$ && $(b \bmod 2) == 0)$
   return $2 \times$ Binarygcd$(a/2, b/2)$.

4° if $((a \bmod 2) == 0$ && $(b \bmod 2) == 1)$
   return Binarygcd$(a/2, b)$

5° if $((a \bmod 2) == 1$ && $(b \bmod 2) == 0)$
   return Binarygcd$(a, b/2)$

6° return Binarygcd$((|a| - |b|)/2, b)$

i	a	b	Condición		
1	412	260	3°	→	$2 *$ Binary gcd $(206, 130)$
2	206	130	3°	→	$2 *$ Binary gcd $(103, 65)$
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	2	1°	→	Binary gcd $(19, 2)$
8	19	1	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 $(1, 0)$
15	1	0	2°	→	1

$2 * 2 = \boxed{4}$
$2 * a = 2$
$\downarrow$
1

MCD$(412, 260)$

$\dfrac{4}{''}$

15
iteraciones

Algoritmo 5

$g = 1$

while $((412 \bmod 2) == 0)$ && $((260 \bmod 2) == 0)$

$a = 206$, $b = 130$, $g = 2$

↻ while $((206 \bmod 2) == 0$ && $(130 \bmod 2) == 0)$

$a = 103$, $b = 65$, $g = 4$

while $(a \mid \neq 0)$ ✓

$\qquad$ while $((103 \bmod 2) == 0)$ ✗

$\qquad$ while $((65 \bmod 2) == 0)$ ✗

$\qquad t = \lvert 103 - 65 \rvert / 2 = 38$

$(a >= b)? (a = 38) : (b = 38)$

↻ while $(38 \, != 0)$ ✓

$\qquad$ while $((38 \bmod 2) == 0)$ ✓

$\qquad a = 38 / 2 = 17$

$\qquad$ while $((65 \bmod 2) == 0)$ ✗

$\qquad t = \lvert 17 - 65 \rvert / 2 = 24$

$(a >= b)? (a = 24) : (b = 24)$

↻ while $(17 \mid = 0)$

$\qquad$ while $((17 \bmod 2) == 0)$ ✗

$\qquad$ while $((24 \bmod 2) == 0)$ ✓

$\qquad b = 3$

$\qquad t = \lvert 17 - 3 \rvert / 2 = 7$

$(a >= b)? (a = 7) : (b = 7)$

1) while (7 != 0)
  while ((7 mod 2) == 0) ✗
  while ((3 mod 2) == 0) ✗

  t = |7-3| / 2 = 2

  (a >= b) ? (a = 2) : (b = 2)

2) while (2 != 0)
  while ((2 mod 2) == 0) ✓
    a = 2/2 = 1
  while ((3 mod 2) == 0) ✗

  t = | 1-3 | / 2 = 1

  (a >= b) ? (a = 1) : (b = 1)

3) while (1 != 0)
  while ((1 mod 2) == 0) ✗
  while ((1 mod 2) == 0) ✗

  t = |1-1| / 2 = 0

  (a >= b) ? (a = 0) : (b = 0)

  a = 0 → return (4*1)

  $\boxed{4}$

  MCD (412, 260) = 4

Algoritmo 6

GCD (412, 260)

while $412 \neq 260$ do
   if $412 > 260$ then ✓
     $a = 412 - 260 = 152$

↻ if $152 > 260$ then ✗
   else
     $b = 260 - 152 = 108$

↻ if $152 > 108$ then ✓
     $a = 152 - 108 = 44$

↻ if $44 > 108$ then ✗
   else
     $b = 108 - 44 = 64$

↻ if $44 > 64$ then ✗
   else
     $b = 64 - 44 = 20$

↻ if $44 > 20$ then ✓
     $a = 44 - 20 = 24$

↻ if $24 > 20$ then ✓
     $a = 24 - 20 = 4$

↻ if $4 > 20$ then ✗
   else
     $b = 20 - 4 = 16$

↻ if $4 > 16$ then ✗
   else
     $b = 16 - 4 = 12$

↻ if $4 > 12$ then ✗
   else
     $b = 12 - 4 = 8$

↻ if $4 > 8$ then ✗
   else
     $b = 8 - 4 = 4$

$a = b = 4$

Return a

$\boxed{4}$