Trabajo en Clase

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(1) $mcd(231, 1820)$

$= mcd(1820, 231)$

$1820 = 7 \cdot 231 + 203$

$mcd(231, 203)$

$231 = 1 \cdot 203 + 28$

$mcd(203, 28)$

$203 = 7 \cdot 28 + 7$

$mcd(28, 7)$

$28 = 4 \cdot 7 + 0$

$mcd(7, 0)$

$mcd(2597, 1369)$

100

$2597 = 1 \cdot 1369 + 1228$

$mcd(1369, 1228)$

$1369 = 1 \cdot 1228 + 141$

$mcd(1228, 141)$

$1228 = 8 \cdot 141 + 100$

$mcd(141, 100)$

$141 = 1 \cdot 100 + 41$

$mcd(100, 41)$

$100 = 2 \cdot 41 + 18$

$mcd(41, 18)$

$41 = 2 \cdot 18 + 5$

$mcd(18, 5)$

$18 = 3 \cdot 5 + 3$

$mcm(5, 3)$

$5 = 1 \cdot 3 + 2$

$mcd(3, 2)$

$3 = 1 \cdot 2 + 1$

$mcd(2, 1)$

$2 = 1 \cdot 1 + 1$

$mcd(1, 1)$

$1 = 1 \cdot 1 + 0$

$mcd(1, 0)$

c) $mcd(4001, 2689)$

$4001 = 1 \cdot 2689 + 1312$

$mcd(2689, 1312)$

$2689 = 2 \cdot 1312 + 65$

$mcd(1312, 65)$

$1312 = 20 \cdot 65 + 12$

$mcd(65, 12)$

$65 = 5 \cdot 12 + 5$

$mcd(12, 5)$

$12 = 2 \cdot 5 + 2$

$mcd(5, 2)$

$5 = 2 \cdot 2 + 1$

$mcd(2, 1)$

$2 = 1 \cdot 1 + 1$

$mcd(1, 1)$

$1 = 1 \cdot 1 + 0$

$\underline{mcd(1, 0)}$ ◻

② a) $mcd(250, 111)$

$250 = 2 \cdot 111 + 28$ ③

$mcd(111, 28)$

$111 = 3 \cdot 28 + 27$ ②

$mcd(28, 27)$

$28 = 27 \cdot 1 + 1$ ①

$\underline{mcd(27, 1)}$ ◻

b) $250x - 111y = 1$

$28 - 27 \cdot 7 = 1$

$111 - 3 \cdot 28 = 27$

$250 - 2 \cdot 111 = 28$

$28 - (111 - 3 \cdot 28) = 1$

$28 - 111 + 3 \cdot 28 = 1$

$4 \cdot 28 - 111 = 1$

$4(250 - 2 \cdot 111) - 111 = 1$

$4 \cdot 250 - 8 \cdot 111 - 111 = 1$

$4 \cdot 250 - 9 \cdot 111 = 1$

$\boxed{x = 4}$ $\boxed{y = -9}$

Multiplos de $\underline{4, -9.}$ ◻

c) $250x + 111y = 19$

tomando en cuenta que $x = 4$ & $y = -9$ es una solución multiplicamos los mismos por 19.

$$\begin{array}{r} \overset{3}{19} \\ 4 \\ \hline 76 \end{array} \qquad \begin{array}{r} \overset{8}{19} \\ 9 \\ \hline -171 \end{array}$$

∴ todos los múltiplos de $x = 76$ & $y = -171$

Comprobación:

$250(76) + 111(-171) = 19$

$19{,}000 - 18{,}981 = 19$

$19 = 19$ ✓

③ Encontrar "c" para la ecuaciones diofantiana:

$$12x + 16y = c$$

encontramos mcd (12, 16)

$16 = 12 \cdot 1 + 4$

mcd (12, 4)

$12 = 3 \cdot 4 + 0$

mcd (4, 0)

es $\underline{4}$

∴ la ecuación diofantiana presentada anteriormente tiene una solución "c" tal que "c" será multiplo de: $\underline{4}$.

④ $mcd(180, 162, 126)$

$$\underbrace{mcd(180, \underbrace{mcd(162, 126)}_{1})}_{2}$$

① $mcd(162, 126)$

$162 = 1 \cdot 126 + 36$

$mcd(126, 36)$

$126 = 3 \cdot 36 + 18$

$mcd(36, 18)$

$36 = 2 \cdot 18 + 0$

$\underline{mcd(18, 0)}$

② $mcd(180, 18)$

$180 = 10 \cdot 18 + 0$

$\underline{mcd(18, 0)}$

El mcd es $\underline{18}$

⑤ Si $a, b \in \mathbb{Z}^+$ con $a = 630$, $mcd(a, b) = 105$ & $mcm(a, b) = 242{,}550$, determine el valor de b.

$$\underbrace{mcd(a,b)}_{105} \cdot \underbrace{mcm(a,b)}_{242{,}550} = a \cdot b$$

$105 \cdot 242{,}550 = 630 \cdot b$

$$\frac{105 \cdot 242550}{630} = b$$

$\underline{b = 40425}$

$mcd(630, 40425)$

$40425 = 64 \cdot 630 + 105$

$mcd(630, 105)$

$630 = 105 \cdot 6 + 0$

$\underline{mcd(105, 0)}$ ✓

(6) Ganó Gary $1020 en 20, 50, si $50x > 20y$
¿Cuantas fichas de 20 & 50 puede tener?

$1020 = 20 \cdot 50 + 20 \cdot 1$

Podría tener 20 fichas de 50 &
1 de 20.

$$50x + 20y = 1020$$

$$x = x_0 + \frac{b}{mcd(a,b)} \cdot k$$

mcd(50, 20)

$50 = 20 \cdot 2 + 10$

mcd(20, 10)

$20 = 10 \cdot 2 + 0$

$50x + 20y = 10$

$x = 1 \quad y = 2$ mcd(50,20) = 10

pero $x > y$ entonces
hay que encontrar

$$y = y_0 - \frac{a}{mcd(a,b)} k$$

$$x = 102 + \frac{20}{10} k$$

$$y = -204 - \frac{50}{10} k$$

$x > y$

$102 + 2k > -204 - 5k$

$7k > -204 - 102$

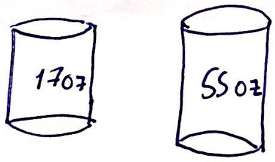
$k > -\frac{306}{7} \approx -43$

~~$x = 18$~~

~~$y = 6$~~

$\therefore t = -42$

(7)



mcd(55, 17)

$55 = 3 \cdot 17 + 4$

mcd(17, 4)

$17 = 4 \cdot 4 + 1$

mcd(4, 1)

$$17x + 55y = 1$$

La respuesta es que
puede usarla de infinitas
maneras.

$17 - 4 \cdot 4 = 1$

$17 - 4(55 - 3 \cdot 17) = 1$

$17 - 4 \cdot 55 + 12 \cdot 17 = 1$

$13 \cdot \underbrace{17}_{a} - 4 \cdot \underbrace{55}_{b} = 1$

$x = 13 \quad y = -4$

múltiplos de $x = 13$ & $y = -4$.

13 servidas del de 17 &
4 vaciadas del de 55,
quedará 1 onza en el
de 17.