Shahd Ismail

① Use the division algorithm to find gcd $(104, 524) = d$

Then find C_1, C_2 s.t $d = 524C_1 + 104C_2$

$$\begin{array}{r|l} & 5 \\ \hline 104 & 524 \\ & 520 \\ \hline & 4 \end{array} \rightarrow \begin{array}{r|l} & 26 \\ \hline 4 & 104 \\ & 104 \\ \hline & 0 \end{array}$$ Stop

$\underline{\underline{d = 4}}$

$4 = 524 - (104)(5)$

$\underline{\underline{C_1 = 1}}$ $\underline{\underline{C_2 = 5}}$

② Find gcd $(9, 128) = d$

Find C_1, C_2 s.t $d = 128C_1 + 9C_2$

$$\begin{array}{r|l} & 14 \\ \hline 9 & 128 \\ & 126 \\ \hline & 2 \end{array} \rightarrow \begin{array}{r|l} & 4 \\ \hline 2 & 9 \\ & 8 \\ \hline & 1 \end{array} \rightarrow \begin{array}{r|l} & 2 \\ \hline 1 & 2 \\ & 2 \\ \hline & 0 \end{array}$$ Stop

$\underline{\underline{d = 1}}$

$1 = 9 - (4)(2)$

$\downarrow$

$128 - (14)(9)$

$1 = 9 - (4)(128 - (14)(9))$

$1 = 9 - (4)(128) + (56)(9)$

$1 = (-4)(128) + (57)(9)$

$\underline{\underline{C_1 = -4}}$ $\underline{\underline{C_2 = 57}}$

Sheikh Abdur Raheem Ali Class @ 12

1. Use the Euclidean Algorithm to find $d = gcd(104, 524)$
   Then find $c_1, c_2 \in \mathbb{Z}$ such that

$$524c_1 + 104c_2 = d$$

Solution: by successive use of the division algorithm we get:

$$\begin{array}{r} 5 \\ 104\,\overline{)\,524} \\ \underline{520} \\ 4 \end{array} \qquad \begin{array}{r} 26 \\ 4\,\overline{)\,104} \\ \underline{80} \\ 24 \\ \underline{24} \\ 0 \end{array}$$

Hence, $gcd(524, 104) = 4$ because 4 is the last nonzero remainder.

Using the next to last division, we can express d as a linear combination of 524 and 104. We find that

$$4 = 524 - 104 * 5$$

Hence, $c_1 = 1, c_2 = -5$

2. Use the Euclidean Algorithm to find $d = gcd(9, 128)$
   Then find $c_1, c_2 \in \mathbb{Z}$ such that

$$128c_1 + 9c_2 = d$$

Solution: by successive use of the division algorithm we get:

$$\begin{array}{r} 14 \\ 9\,\overline{)\,128} \\ \underline{90} \\ 38 \\ \underline{36} \\ 2 \end{array} \qquad \begin{array}{r} 4 \\ 2\,\overline{)\,9} \\ \underline{8} \\ 1 \end{array} \qquad \begin{array}{r} 2 \\ 1\,\overline{)\,2} \\ \underline{2} \\ 0 \end{array}$$

Hence, $gcd(9, 128) = 1$ because 1 is the last nonzero remainder.

Using the next to last division, we can express d as a linear combination of 128 and 9. We find that

$$1 = 9 - 2 * 4$$

The first division tells us that

$$2 = 128 - 9 * 14$$

So $1 = 9 - (128 - 9 * 14) * 4$, which simplifies to

$$1 = 9 * 57 - 128 * 4$$

Hence, $c_1 = -4, c_2 = 57$
[1]

[1] Made By Sheikh Abdul Raheem Ali b00075108 using LaTeX