

Тема 5 - № 2

$$(a) \begin{cases} \hat{x} + 4\hat{y} = \hat{1} \\ 5\hat{x} + 7\hat{y} = \hat{1} \end{cases}, \quad \hat{x}, \hat{y} \in \mathbb{Z}_9$$

$$\begin{cases} 5\hat{x} + 20\hat{y} = \hat{0} \\ 5\hat{x} + 7\hat{y} = \hat{1} \end{cases}$$

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$$(-)$$

$$15\hat{y} = \hat{0}$$

$$(\hat{y}, 9) = 1 \Rightarrow \hat{y} \in \mathbb{Z}(\mathbb{Z}_9)$$

$$\hat{y} = \hat{y} \cdot \hat{y}^{-1} = \hat{1}$$

$$\hat{x} = \hat{1} - \hat{y} = -\hat{3} = \hat{6}$$

$$(\hat{x}, \hat{y}) = (\hat{6}, \hat{1})$$

$$b) \begin{cases} 17x + 11z = 7 \\ 13x + 10z = 8 \end{cases} \quad \text{in } \mathbb{Z}_{29} \quad \Rightarrow$$

$$\Rightarrow \begin{cases} 4\hat{x} + 7\hat{y} = -1 \\ 13\hat{x} + 10\hat{y} = 8 \end{cases} \Rightarrow \begin{cases} 4\hat{x} + 7\hat{y} = -1 \\ 13\hat{x} + 10\hat{y} = 8 \end{cases}$$

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$$x_{29} = (1, 0), \quad x_{27} = (0, 1)$$

$$\widehat{27} \cdot \widehat{x} = \widehat{11}$$

$$29 = 27 \cdot 1 + 2 \quad , \quad x_{27} - x_{29} = (1, -1)$$

$$27 = 2 \cdot 13 + 1$$

$$7 = 13 \cdot 27$$

$$\widehat{27}^{-1} = \widehat{14}$$

$$\hat{x} = 11 \cdot 14 = 154 = \hat{y}$$

$$\hat{f} = -\hat{1} - 3\hat{6} = -\hat{1} - \hat{7} = -\hat{8} = 2\hat{7}$$

$$(\hat{x}, \hat{z}) = (\hat{y}, \hat{z}_1)$$