Exercice 2

1/ $a = 2002$, $b = 3$, $c = 21$

I способ

$\frac{2002}{63} = \frac{286}{9}$

$2002 = 63 \cdot 31 + 49$

$63 = 49 \cdot 1 + 14$

$49 = 14 \cdot 2 + 7$

$14 = 7 \cdot 2 + 0$

$286 = 9 \cdot 31 + 7$

$9 = 7 \cdot 1 + 2$

$7 = 2 \cdot 3 + 1$

$2 = 1 \cdot 2$

$\Rightarrow \frac{2002}{3021} = [31 ; 1 ; 3 ; 2]$

II способ

$\frac{2002}{63} = \frac{286}{9} = 31 + \frac{7}{9} = 31 + \frac{1}{9/7}$

$= 31 + \frac{1}{1 + 2/7}$

$= 31 + \frac{1}{1 + \frac{1}{7/2}}$

$= 31 + \frac{1}{1 + \frac{1}{3 + \frac{1}{2}}}$

ОТВЕТ : $[31 ; 1 ; 3 ; 2]$

2/ $b = 3$, $c = 21$

$\sqrt{63} = 7 + (\sqrt{63} - 7) = 7 + \frac{1}{\left(\frac{1}{\sqrt{63} - 7}\right)} = 7 + \frac{1}{\frac{\sqrt{63} + 7}{14}} = 7 + \frac{1}{1 + \frac{\sqrt{63} - 7}{14}}$

$= 7 + \frac{1}{1 + \frac{1}{\frac{14}{\sqrt{63} - 7}}} = 7 + \frac{1}{1 + \frac{1}{14 + \sqrt{63} - 7}} = 7 + \frac{1}{1 + \frac{1}{14 + \frac{1}{\left(\frac{1}{\sqrt{63} - 7}\right)}}}$

$= 7 + \frac{1}{1 + \frac{1}{14 + \frac{1}{1 + \frac{\sqrt{63} - 7}{14}}}}$

ОТВЕТ : $[7 ; \overline{1 ; 14}]$

(2) $26^{10^3} \bmod 45$

$K = 10^3 \Rightarrow 26^K \bmod 45$

$\varphi(45) = 24$

$K = 24n + b = 10^3$

$b = 10^3 \bmod 24 = 1000 \bmod 24 = 16$

$26^{24n+b} \bmod 45 = (26^{24n} \cdot 26^b) \bmod 45 = 26^b \bmod 45$

$26^b \bmod 45 = 1 \bmod 45$

$16^{10} = 10000_2$

	a_i	c	c^2	$c^2 a$	$c^2 a \bmod K$
	1	1	1	26	26
	0	26	676	676	1
	0	1	1	1	1
	0	1	1	1	1
	0	1	1	1	1

ÖTBET : 1

(3) $X = 45$, $d = 21$, $K = 10$, $C = 2002$

$45^{31} \bmod 2002$

$31_{10} = 11111_2$

a_i	c	c^2	$c^2 a$	$c^2 a \bmod K$
1	1	1	45	45
1	45	2025	91125	1035
1	1035	1071225	48205125	969
1	969	938961	42253245	1035
1	1035	1071225	48205125	969

ÖTBET : 969