

Вариант 4

Гроздь

1) $e = 19$ $m = 115$
 $(8; 81; 62; 79)$ 2-33 (без E)

$$\varphi(m) = \varphi(5) \cdot \varphi(23) = 88$$

$$de = 1 \bmod 88$$

$$19d = 1 \bmod 88$$

$$19d + 88y = 1$$

$$i \quad -1 \quad 0 \quad 1 \quad 2$$

$$q \quad 19 \quad 88 \quad 19 \quad 12 \quad \mathbf{7} \quad 5 \quad 2 \quad 1$$

$$r \quad 0 \quad 4 \quad 1 \quad \mathbf{1} \quad 1 \quad 2$$

$$d_0 \quad 1 \quad 0 \quad 1 \quad -4 \quad 5 \quad -9 \quad 14 \quad -37$$

$$d = -37 + 88k, k \in \mathbb{Z}$$

$$d = 51$$

$$8^{51} \bmod 115 = 12 \quad K$$

$$81^{51} \bmod 115 = 16 \quad O$$

$$62^{51} \bmod 115 = 18 \quad P$$

$$79^{51} \bmod 115 = 14 \quad M$$

Ответ: KOPM

2) ~~M(23), H(34), O(53), A(61), P(33), T(21), T(23)~~

U(32), Y(78), W(46), U(39), Z(29), B(86), b(15)
 b(86), Y(78), W(46), U(39), U(32), Z(29), b(15)
 b(86), Y(78), W(46), Z(44), U(39), U(32)
 b(86), Y(78), U(71), W(46), Z(44)

~~b(86), Y(78), U~~

~~b(86)~~ ~~U(78)~~ W Z(90) b(86) Y(78) U U(71)

Y U U(149) W Z(90) b(86)

~~U(78)~~ W Z b(176) Y U U(149).

W Z b b(1) Y U U(0)

W Z b(11) b(10) Y U U(0)

W Z b(11) Y(01) U U(00)

W(111) Z b(110) U U(00)

Z b(110) U(001) U(000)

Z(1101) b(1100)

Order: U: 000

Z: 1101

Y: 01

b: ~~10~~ 10

W: 111

b: 1100

U: 001

3) $\begin{array}{cccccccc} & 1 & 0 & 0 & 1 & 1 & 1 & 0 \\ & 6 & 1 & 2 & 3 & 4 & 5 & 6 & 7 \end{array}$

0: 1

1: $1+0 = 1$

2: $1+0+0 = 1$

3: $1+0+0+1 = 0$

4: $1+0+0+1+1 = 1$

5: $1+0+0+1+1+1 = 0$

6: $1+0+0+1+1+1+1 = 1$

7: $1+0+0+0+1+1+1+0 = 1$

$11101011_2 = 1+2+8+32+64+128 = 235$

Ответ: 235

4) Дана - 3 в Z_5 , не более 1 см.

(0) (1) (2) (3) (4)

4 4 0 3 2

Искомый многочлен - $P(x)$ $\deg \leq 2$

Фактический - $\hat{P}(x)$ $\deg \leq 4$

Проверка на ошибку - $Q(x) = x - d$

Тогда верно: $Q(x) \cdot P(x) = Q(x) \hat{P}(x)$

$Q(x)$
 $\deg \leq 3$

$$q_0 + q_1 x_i + q_2 x_i^2 + q_3 x_i^3 = (x_i - d) \hat{p}(x_i)$$

$$0: q_0 = d$$

$$1: q_0 + q_1 + q_2 + q_3 = d - 1$$

$$2: q_0 + 2q_1 + 4q_2 + 3q_3 = 0$$

$$3 \equiv (-2): q_0 - 2q_1 + 4q_2 - 3q_3 = 2d + 4$$

$$4 \equiv (-1): q_0 - q_1 + q_2 - q_3 = 3d + 3$$

$$2q_0 + 2q_2 = 4d + 2$$

$$q_2 = d + 1$$

$$2q_1 + 2q_3 = 3d + 1$$

$$q_1 + q_3 = 4d + 3$$

$$\begin{cases} d + 2(4d + 3) + 4(d + 1) + q_3 = 0 \\ d - 2(4d + 3) + 4(d + 1) - q_3 = 2d + 4 \end{cases}$$

$$\begin{cases} d - 2(4d + 3) + 4(d + 1) - q_3 = 2d + 4 \end{cases}$$

$$\begin{cases} 13d + 10 + q_3 = 0 \\ -5d - 6 - q_3 = 0 \end{cases} \Rightarrow \begin{cases} 3d + q_3 = 0 \\ q_3 = 4 \end{cases}$$

$$d = 2 \quad - \text{ошибка при } x = 2$$

$$q_1 = 2$$

$$q_0 = 2$$

$$q_2 = 3$$

$$q_3 = 4$$

$$P(x) = \frac{Q(x)}{\Phi(x)}$$

$$Q(x) = 4x^3 + 3x^2 + 2x + 2$$

$$\Phi(x) = x - 2 = x + 3$$

$$\begin{array}{r|l} 4x^3 + 3x^2 + 2x + 2 & x + 3 \\ \hline - 4x^3 + 2x^2 & \\ \hline & x^2 + 2x \\ & - x^2 + 3x \\ \hline & 4x + 2 \\ & - 4x + 2 \\ \hline & 0 \end{array}$$

$$P(x) = 4x^2 + x + 4 \Rightarrow (4, \underline{1}, 4)$$

$$\text{Answer: } (4, \underline{1}, 4)$$