1) $3575x + 1846y = 117 \quad | : 13$

$3575 - 1846 = 1729$

$1846 - 1729 = 117$

$1729 - 117 \cdot 14 = 91$

$117 - 91 = 26$

$91 - 77 = 13$

$26 - 26 = 0$

$275x + 142y = 9$

i	-1	0	1	2	3	4	
r	275	142	133	9	7	2	1 0
q		1	1	14	1	3	2
x_0	1	0	1	-1	15	-16	63
y_0	0	1	-1	2	-29	31	-122

567

$x_0 = 63 \cdot 9 + 142k$

$y_0 = -1098 - 275k$

Ответ: $x = 567 + 142k$

$y = -1098 - 275k, \quad k \in \mathbb{Z}$

2) $\sqrt{359} = 18 + (\sqrt{359} - 18) = 18 + \frac{1}{\frac{1}{\sqrt{359} - 18}}$

$= 18 + \frac{1}{\frac{1}{\sqrt{359} - 18}} = 18 + \frac{1}{\frac{\sqrt{359} + 18}{35}}$

$= 18 + \frac{1}{1 + \frac{\sqrt{359} - 17}{35}} = 18 + \frac{1}{1 + \frac{1}{\frac{35}{\sqrt{359} - 17}}}$

$= 18 + \frac{1}{1 + \frac{1}{17 + \frac{\sqrt{359} - 17}{2}}} = 18 + \frac{1}{1 + \frac{1}{17 + \frac{1}{\frac{2}{\sqrt{359} - 17}}}}$

$= 18 + \frac{1}{1 + \frac{1}{17 + \frac{1}{\frac{\sqrt{359} + 17}{35}}}} = 18 + \frac{1}{1 + \frac{1}{17 + \frac{1}{1 + \frac{\sqrt{359} - 18}{35}}}}$

$= 18 + \frac{1}{1 + \frac{1}{17 + \frac{1}{1 + \frac{35}{\sqrt{359} + 18}}}} = 18 + \frac{1}{1 + \frac{1}{17 + \frac{1}{1 + \frac{1}{\frac{35}{\sqrt{359} - 18}}}}}$

$= 18 + \frac{1}{1 + \frac{1}{17 + \frac{1}{1 + \frac{1}{\sqrt{359} + 18}}}} = 1 + \frac{1}{36 + (\sqrt{359} - 18)}$

Ответ:

=> $18; \overline{1, 17, 1, 36}$

3) $x_1 \equiv 7^{4} \bmod 20$ m_1

$x_2 \equiv 27^{12} \bmod 39$ m_2

$x_3 \equiv 9^{23} \bmod 11$ m_3

$x_4 \equiv 18^{14} \bmod 31$ m_4

$M = 20 \cdot 39 \cdot 11 \cdot 31 = 265980$

$M_1 = 39 \cdot 11 \cdot 31 = 13299$

$M_2 = 20 \cdot 11 \cdot 31 = 6820$

$M_3 = 20 \cdot 39 \cdot 31 = 24180$

$M_4 = 20 \cdot 39 \cdot 11 = 8580$

$M_1 x_1 \equiv 1 \bmod m_1$

$13299 x_1 + 20y' = 1$

i	-1	0	1	2	3
r	13299	20	19	1	0
q		664	1	19	
x	1	0	1	-1	
y					

$x_1 \equiv -1 \bmod 20 \equiv 19 \bmod 20$

$M_2 x_2 \equiv 1 \bmod m_2$

$6820 x_2 \equiv 1 \bmod 39$

$6820 x_2 + 39y' = 1$

i	-1	0	1	2	3
r	6820	39	34	5	4	1
q		174	1	6	1	
x	1	0	1	-1	7	-8

$x_2 \equiv -8 \bmod 39 \equiv 31 \bmod 39$

$M_3 x_3 \equiv 1 \bmod m_3$

$24180 x_3 + 11y' = 1$

$x_3 \equiv -5 \bmod 11 \equiv 6 \bmod 11$

i	-1	0	1	2	3
r	24180	11	2	1	
q		2198	5		
x	1	0	1	-5	

$M_4 x_4 \equiv 1 \bmod m_4$

$8580 x_4 + 31y' = 1$

$x_4 \equiv -9 \bmod 31 \equiv$

$\equiv 22 \bmod 31$

i	-1	0	1	2	3	
r	8580	31	24	7	3	1
q		276	1	3	2	
x	1	0	1	-1	4	-9

14634387

$x \equiv (13299 \cdot 19 \cdot 7 + 6820 \cdot 31 \cdot 27 + 24180 \cdot 6 \cdot 9 + 8580 \cdot 22 \cdot 18) \bmod 265980 \equiv$ ~~$5407 \bmod 265980$~~

$\equiv 12180507 \bmod 265980 \equiv 211407 \bmod 265980$

Ответ: $211407 \bmod 265980$

4)

5) $p(3) = -47$

$p(1) = -1$

$p(-1) = 5$

$p(4) = -40$

$p(2) = -22$

$$f(x) = \frac{(x-1)(x+1)(x-4)(x-2)}{(3-1)(3+1)(3-4)(3-2)} \cdot (-47) +$$

$$+ \frac{(x-3)(x+1)(x-4)(x-2)}{(1-3)(1+1)(1-4)(1-2)} (-1) +$$

$$+ \frac{(x-3)(x-1)(x-4)(x-2)}{(-1-3)(-1-1)(-1-4)(-1-2)} \cdot 5 +$$

$$+ \frac{(x-3)(x-1)(x+1)(x-2)}{(4-3)(4-1)(4+1)(4-2)} (-40) +$$

$$+ \frac{(x-3)(x-1)(x+1)(x-4)}{(2-3)(2-1)(2+1)(2-4)} (-22) =$$

$$= \frac{47}{8}(x-1)(x+1)(x-4)(x-2) + \frac{1}{12}(x-3)(x+1) \cdot$$

$\cdot (x-4)(x-2) + \frac{1}{24}(x-3)(x-1)(x-4)(x-2) +$

$+\left(-\frac{4}{3}\right)(x-3)(x-1)(x+1)(x-2) + \left(-\frac{11}{3}\right)(x-3)(x-1) \cdot$

$\cdot (x+1)(x-4) = \frac{47}{8}$

$\frac{47}{8}(x^2-8)(x-4)(x-2) = \frac{47}{8}(x^3-x-4x^2+4)(x-2) =$

$= \frac{47}{8}(x^3-4x^2-x+4)(x-2) = \frac{47}{8}(x^4-4x^3-x^2+4x-2x^3+8x^2+2x-8) =$

$= \frac{47}{8}(x^4-6x^3+7x^2+6x-8)$

$\frac{1}{12}(x^2-2x-3)(x-4)(x-2) = \frac{1}{12}(x^3-2x^2-3x-4x^2+8x+12)(x-2)$

$= \frac{1}{12}(x^4-6x^3+5x^2+12x-2x^3+12x^2-10x-24) =$

$= \frac{1}{12}(x^4-8x^3+17x^2+2x-24)$

$\frac{1}{24}(x-3)(x-1)(x-4)(x-2) = 24(x^2-4x+3)(x-4)(x-2) =$

$= \frac{1}{24}(x^3-4x^2+3x-4x^2+16x-12)(x-2) =$

$= \frac{1}{24}(x^4-8x^3+19x^2-12x-2x^3+16x^2-38x+24) =$

$= \frac{1}{24}(x^4-10x^3+35x^2-50x+24)$

$-\frac{4}{3}(x-3)(x-1)(x+1)(x-2) = -\frac{4}{3}(x^2-1)(x-3)(x-2) =$

$= -\frac{4}{3}(x^3-3x^2-x+3)(x-2) = -\frac{4}{3}(x^4-3x^3-x^2+3x-2x^3+6x^2+$

$+2x-6) = -\frac{4}{3}(x^4-5x^3+5x^2+5x-6)$

$$-\frac{11}{3}(x-3)(x-1)(x+1)(x-4) = -\frac{11}{3}(x^3-3x^2-x+3)\cdot(x-4) = -\frac{11}{3}(x^4-3x^3-x^2+3x-4x^3+12x^2+4x-12)$$

$$= -\frac{11}{3}(x^4-7x^3+11x^2+7x-12)$$

Е) $\left(\frac{47}{8}+\frac{1}{12}+\frac{1}{24}-\frac{4}{3}-\frac{11}{3}\right)x^4+\left(\frac{47}{8}(-6)+\frac{1}{12}(-8)+\frac{1}{24}(-10)+\right.$

$\left.+\left(-\frac{4}{3}\right)(-5)+\left(-\frac{11}{3}\right)(-3)\right)x^3+\left(\frac{47}{8}(17)+\frac{1}{12}(17)+\right.$

$\left.+\frac{1}{24}(35)+\left(-\frac{4}{3}\right)5+\left(-\frac{11}{3}\right)\cdot 11\right)x^2+\left(\frac{47}{8}\cdot 6+\frac{1}{12}\cdot 2+\right.$

$\left.+\frac{1}{24}\cdot(-60)+\left(-\frac{4}{3}\right)\cdot 5+\left(-\frac{11}{3}\right)\cdot 7\right)x+\left(\frac{47}{8}\cdot(-8)+\right.$

$\left.+\frac{1}{12}(-24)+\frac{1}{24}(24)+\left(-\frac{4}{3}\right)\cdot(-6)+\left(-\frac{11}{3}\right)(-12)\right) =$

$= \frac{23}{24}x^4+\frac{1}{4}x^3+835\frac{13}{24}x^2-1196\frac{11}{12}x+$

$+673 = x^4-4x^3-3x^2+x+4$

7) $7x+127=703$ в 8-рич СС

1.

$7x = 703-127$

$\begin{array}{r} 703 \\ -127 \\ \hline 554 \end{array}$

$7x = 554$

$x = 64_8$

$\begin{array}{r|l} 554 & 7 \\ -52 & 64 \\ \hline 34 & \\ -34 & \\ \hline 0 & \end{array}$

2. $7x + 127 = 703$

$7x + 77 = 451$

$7x = 364$

$x = 52$

Ответ: 64_8; 52_{10}

8) $x = \frac{11}{26} \bmod 99$

$26x = 11 \bmod 99$

$26x + 99y = 11$

i	-1	0	1	2	3	4
r	26	99	26	21	5	1
q		0	3	1	4	
x	1	0	1	-3	4	-19

$x = -11 \cdot 19 + 99k = -209 + 99k$

~~$x = 88 \bmod 99$ НОД(1;2) => как~~

$x = 88$

9) $\frac{447}{202} = 2 + \frac{43}{202} = 2 + \frac{1}{\frac{202}{43}} = 2 + \frac{1}{4 + \frac{30}{43}} =$

$$= 2 + \cfrac{1}{4 + \cfrac{1}{\frac{43}{30}}} = 2 + \cfrac{1}{4 + \cfrac{1}{1 + \frac{13}{30}}} = 2 + \cfrac{1}{4 + \cfrac{1}{1 + \cfrac{1}{2 + \frac{4}{13}}}} =$$

$$= 2 + \cfrac{1}{4 + \cfrac{1}{1 + \cfrac{1}{2 + \cfrac{1}{3 + \frac{1}{4}}}}}$$

Ответ: 2; 4, 1, 2, 3, 4

10) $2x^5 + x^3 + 2x^2 + x + 2 \;\big|\; x^3 + x^2 + x + 1$

$2x^5 + 0 \cdot x^4 + x^3 + 2x^2 + x + 2 \;\big|\; x^3 + x^2 + x + 1$

$2x^5 + 2x^4 + 2x^3 + 2x^2 \qquad\qquad 2x^2 + x + 1$

$x^4 + 2x^3 + 0 \cdot x^2 + x$

$x^4 + x^3 + x^2 + x$

$x^3 + 2x^2 + 0 \cdot x + 2$

$x^3 + x^2 + x + 1$

$x^2 + 2x + 1$

Ответ: $x^2 + 2x + 1$