3/nr.22

a) Convertiți nr. 11001 din baza 2 în baza 10

$$11001_2 = 1 \cdot 2^4 + 1 \cdot 2^3 + 0 \cdot 2^2 + 0 \cdot 2^1 + 1 \cdot 2^0$$

$$= 1 \cdot 16 + 1 \cdot 8 + 0 + 0 + 1$$

$$= 16 + 8 + 1$$

$$= 25_{10}$$

b) Convertiți numărul 1A din baza 16 în baza 10

$$A = 10 \qquad 1A_{16} = 1 \cdot 16^1 + 10 \cdot 16^0 = 16 + 10 = 26_{10}$$

c) Convertiți numărul 125 din baza 7 în baza 4

$$\begin{array}{r} 49 \cdot \\ \cdot 4 \\ \hline 63 \end{array}$$

$$127_7 = 1 \cdot 7^2 + 2 \cdot 7^1 + 7 \cdot 7^0$$

$$= 49 + 14 + 7$$

$$= 63 + 7 = 70_{10}$$

$$70_{10} = ?_4 \qquad\qquad 70_{10} = 1012_4$$

$$70 : 4 = 17 \text{ rest } 2 \qquad\qquad 68 : 4 = 17 \text{ rest } 0$$
$$17 : 4 = 4 \text{ rest } 1 \qquad\qquad 17 : 4 = 4 \text{ rest } 1$$
$$4 : 4 = 1 \text{ rest } 0 \qquad\qquad 11 : 4 = 1 \text{ rest } 0$$
$$1 : 4 = 0 \text{ rest } 1 \qquad\qquad 1 : 4 = 0 \text{ rest } 1$$

$$127_7 = 1012_4 \qquad\qquad 125_7 = 1010_4$$

Trebuia 125. $\qquad 125_7 = 1 \cdot 7^2 + 2 \cdot 7^1 + 5 \cdot 7^0 = 49 + 14 + 5 = 68_{10}$

$$68_{10} = 1010_4$$

d) Scădeţi numerele 25 şi 12 în baza 8.

$$25_8 - 12_8 = 13_8$$

$$\begin{array}{r} 25 \, - \\ 12 \\ \hline 13_8 \end{array}$$

4/ nr. 22

Calculează $83^{157} \mod 163$.

$83^{157} \mod 163$

$83^{157} = 83 \cdot 83^{156} = 83 \cdot (83^2)^{78} = 83 \cdot 1849^{78} \equiv 83 \cdot 6889^{78} \equiv 83 \cdot 43^{78}$

$\equiv 83 \cdot (43^2)^{39} \equiv 83 \cdot 1849^{39} \equiv 83 \cdot (56)^{39} \equiv (83 \cdot 56) \cdot 56^{38}$

$\equiv 84 \cdot (56^2)^{19} \equiv 84 \cdot 3136^{19} \equiv 84 \cdot 39^{19} \equiv (84 \cdot 39) \cdot 39^{18}$

$\equiv 16 \cdot (39^2)^9 \equiv 16 \cdot 1521^9 \equiv 16 \cdot 54^9 \equiv (16 \cdot 54) \cdot 54^8$

$\equiv 864 \cdot (54^2)^4 \equiv 49 \cdot 2916^4 \equiv 49 \cdot 54^4 \equiv 49 \cdot (54^2)^2$

$\equiv 49 \cdot 2916^2 \equiv 49 \cdot 4096 \equiv 49 \cdot 24 \equiv 1629 \equiv$

$53 \mod 163$

$\begin{array}{r|l}
1849 & 163 \\
163 & 11 \\
\hline
=219 \\
163 \\
\hline
==56
\end{array}$

$\begin{array}{r|l}
4618 & 163 \\
326 & 28 \\
\hline
1388 \\
1304 \\
\hline
==84
\end{array}$

$\begin{array}{r|l}
3436 & 163 \\
163 & 1 \\
\hline
1506 \\
1467 \\
\hline
39
\end{array}$

$\begin{array}{r|l}
1521 & 163 \\
1467 & 9 \\
\hline
==54
\end{array}$

$\begin{array}{r|l}
864 & 163 \\
815 & 5 \\
\hline
49
\end{array}$

$\begin{array}{r|l}
1296 & 163 \\
1141 & 7 \\
\hline
==54
\end{array}$

$\begin{array}{r|l}
6889 & 163 \\
652 & 42 \\
\hline
=369 \\
326 \\
\hline
==43
\end{array}$

$\begin{array}{r|l}
3136 & 163 \\
326 & 20 \\
\hline
==16 \\
0 \\
\hline
==16
\end{array}$

$\begin{array}{r|l}
4056 & 163 \\
326 & 25 \\
\hline
836 \\
815 \\
\hline
==21
\end{array}$

$\begin{array}{r|l}
1023 & 163 \\
978 & 6 \\
\hline
51
\end{array}$

$\begin{array}{r|l}
24025 & 163 \\
2282 & 147 \\
\hline
=1205 \\
1141 \\
\hline
==64
\end{array}$