**Soluție**

**1. a.** $f(0)=\begin{pmatrix}1&0&0\\0&1&0\\0&0&1\end{pmatrix}$, $f(1)=\begin{pmatrix}1&1&4\\0&1&4\\0&0&1\end{pmatrix}$; $f(0)+f(1)=\begin{pmatrix}2&1&4\\0&2&4\\0&0&2\end{pmatrix}$.

**b.** $f(1)\cdot f(-1)=f(1-1)=f(0)=I_3$.

**c.** $f(x+y)=\begin{pmatrix}1&x+y&2(x+y)^2+2(x+y)\\0&1&4(x+y)\\0&0&1\end{pmatrix}$; $f(x)f(y)=\begin{pmatrix}1&x+y&2(x+y)^2+2(x+y)\\0&1&4(x+y)\\0&0&1\end{pmatrix}$.

**2.a.** Adăugând la ambele părți ale ecuației $\hat{2}\cdot x+\hat{1}\Leftrightarrow\hat{2}\cdot x+\hat{5}+\hat{1}=\hat{1}+\hat{1}\ \Leftrightarrow\ \hat{2}\cdot x=\hat{2}\Rightarrow x_1=\hat{1}$ și $x_2=\hat{4}$.

**b.** $\Delta=\begin{vmatrix}\hat{1}&\hat{2}&\hat{3}\\\hat{2}&\hat{3}&\hat{1}\\\hat{3}&\hat{1}&\hat{2}\end{vmatrix}=\hat{1}\cdot\hat{2}\cdot\hat{3}+\hat{2}\cdot\hat{1}\cdot\hat{3}+\hat{3}\cdot\hat{2}\cdot\hat{1}-\hat{3}\cdot\hat{3}\cdot\hat{3}-\hat{1}\cdot\hat{1}\cdot\hat{1}-\hat{2}\cdot\hat{2}\cdot\hat{2}=\hat{0}+\hat{0}+\hat{0}+\hat{3}+\hat{5}+\hat{4}=\hat{0}$.

**c.** $\hat{3}x=\hat{3}$ de unde $x=\hat{1},\ y=\hat{2}$ sau $x=\hat{3},\ y=\hat{4}\Rightarrow$ soluțiile $x=\hat{1},\ y=\hat{2}$ sau $x=\hat{3},\ y=\hat{4}$ sau $x=\hat{5},\ y=\hat{0}$.