Example: The relation *R* on the set {a,b,c,d} is represented by matrix

$$\begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 1 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

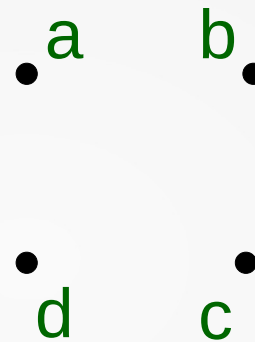Draw the digraph representing relation R using its matrix representation.

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$$
\begin{array}{c}
\quad\; a \quad b \quad c \quad d \\
\begin{array}{c} a \\ b \\ c \\ d \end{array}
\left[\begin{array}{cccc}
1 & 1 & 1 & 0 \\
0 & 1 & 1 & 0 \\
1 & 0 & 1 & 1 \\
0 & 0 & 1 & 1
\end{array}\right]
\end{array}
$$

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A solution:
1) mark the rows and columns with a,b,c, and d.

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0 & 1 & 1 & 0 \\
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\end{array} \right]
\end{array}
$$

a   b

d   c

Draw the digraph representing relation R using its matrix representation.

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3

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$$\begin{array}{c c c c c} & a & b & c & d \\ a & 1 & 1 & 1 & 0 \\ b & 0 & 1 & 1 & 0 \\ c & 1 & 0 & 1 & 1 \\ d & 0 & 0 & 1 & 1 \end{array}$$

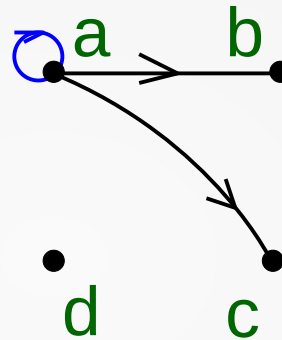Draw the digraph representing relation R using its matrix representation.

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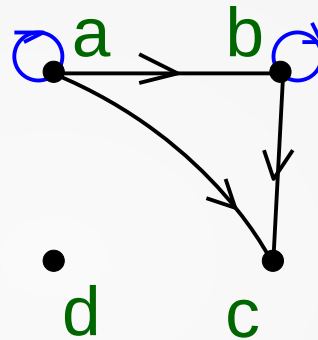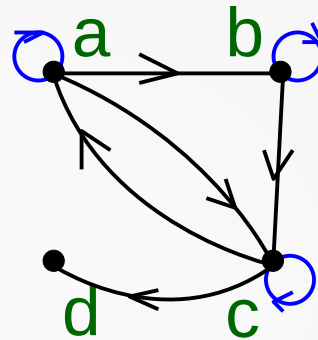Draw the digraph representing relation R using its matrix representation.
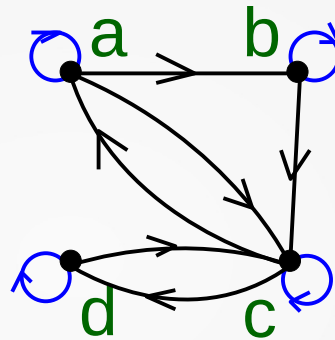
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5

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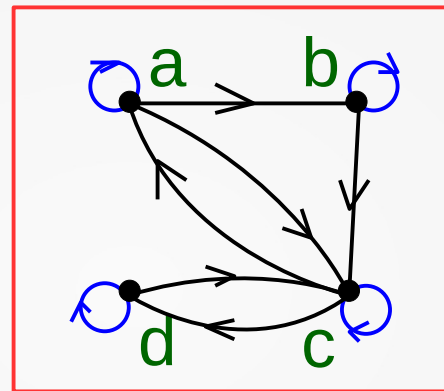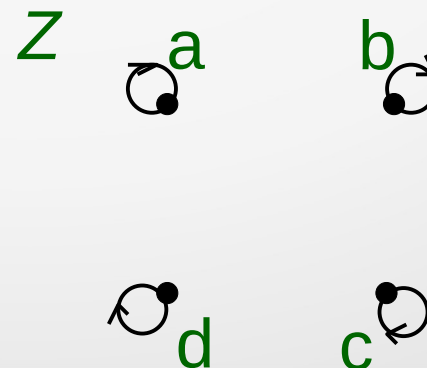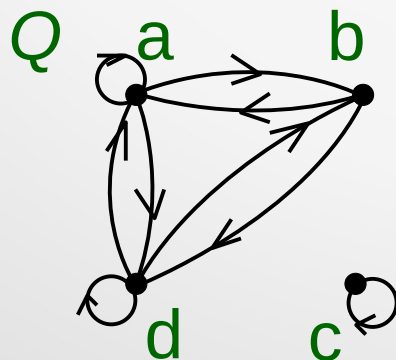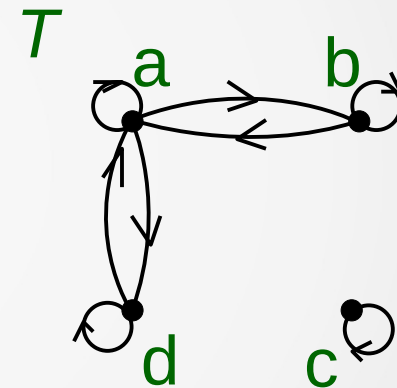Draw the digraph representing relation R using its matrix representation.

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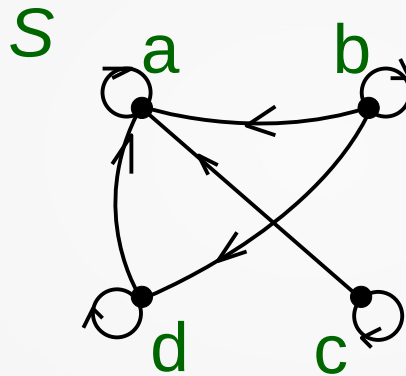Draw the digraph representing relation R using its matrix representation.
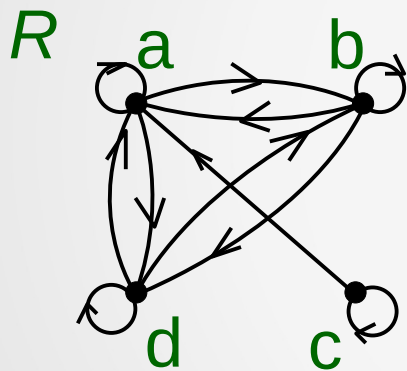
A solution:
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Example 2: Relations *R*, *S, T, Q* and *Z* on the set {a,b,c,d} are represented by matrices and digraphs. Determine whether the given relations are *reflexive*, *symmetric*, *antisymmetric*, and/or *transitive*

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R

reflexive

S

reflexive, antisymmetric, transitive

T

reflexive, symmetric

Q

symmetric, transitive

Z

reflexive, symmetric, antisymmetric, transitive

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