

**Απαντήσεις στις Ασκήσεις του Κεφαλαίου 1**

**1.** (i) Δεν ορίζεται, (ii)  $4 \times 2$ , (iii) Δεν ορίζεται, (iv) Δεν ορίζεται, (v)  $5 \times 5$ , (vi)  $5 \times 2$ , (vii)  $5 \times 5$ , (viii) Δεν ορίζεται.

**2.**

$$(i) \begin{pmatrix} 7 & 6 & 5 \\ -2 & 1 & 3 \\ 7 & 3 & 7 \end{pmatrix}, (ii) \begin{pmatrix} -5 & 4 & -1 \\ 0 & -1 & -1 \\ -1 & 1 & 1 \end{pmatrix}, (iii) \begin{pmatrix} 15 & 0 \\ -5 & 10 \\ 5 & 5 \end{pmatrix}, (iv) \begin{pmatrix} -7 & -28 & -14 \\ -21 & -7 & -35 \end{pmatrix}, (v) \text{ Δεν ορίζεται,}$$

$$(vi) \begin{pmatrix} 22 & -6 & 8 \\ -2 & 4 & 6 \\ 10 & 0 & 4 \end{pmatrix}, (vii) \begin{pmatrix} -39 & -21 & -24 \\ 9 & -6 & -15 \\ -33 & -12 & -30 \end{pmatrix}, (viii) \mathbb{O}, (ix) \begin{pmatrix} 12 & -3 \\ -4 & 5 \\ 4 & 1 \end{pmatrix}, (x) \text{ Δεν ορίζεται,}$$

$$(xi) \begin{pmatrix} 42 & 108 & 75 \\ 12 & -3 & 21 \\ 36 & 78 & 63 \end{pmatrix}, (xii) \begin{pmatrix} 3 & 45 & 9 \\ 11 & -11 & 17 \\ 7 & 17 & 13 \end{pmatrix}.$$

**3.**  $a = 4$ ,  $b = -6$ ,  $d = 1$ ,  $c = -1$ .

**4.**

$$(i) \begin{pmatrix} a_{11} & 0 & 0 & 0 \\ 0 & a_{22} & 0 & 0 \\ 0 & 0 & a_{33} & 0 \\ 0 & 0 & 0 & a_{44} \end{pmatrix}, (ii) \begin{pmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ 0 & a_{22} & a_{23} & a_{24} \\ 0 & 0 & a_{33} & a_{34} \\ 0 & 0 & 0 & a_{44} \end{pmatrix}, (iii) \begin{pmatrix} a_{11} & 0 & 0 & 0 \\ a_{21} & a_{22} & 0 & 0 \\ a_{31} & a_{32} & a_{33} & 0 \\ a_{41} & a_{42} & a_{43} & a_{44} \end{pmatrix}, (iv) \begin{pmatrix} a_{11} & a_{12} & 0 & 0 \\ a_{21} & a_{22} & a_{23} & 0 \\ 0 & a_{32} & a_{33} & a_{34} \\ 0 & 0 & a_{43} & a_{44} \end{pmatrix}$$

**5.** (i) όχι, (ii) όχι, (iii) όχι.

**6.**  $a = -8$ .

**8.**

$$(i) \begin{pmatrix} 2 & -1 \\ -5 & 3 \end{pmatrix}, (ii) \begin{pmatrix} 1/5 & 3/10 \\ -1/5 & 1/10 \end{pmatrix}, (iii) \begin{pmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{pmatrix}.$$

**10.**  $X = CB - A$ .

**11.**  $B = P^{-1}AP$ .

**12.** (i)  $B^{-1}$ , (ii)  $CD^{-1}$ .

**13.**

$$(i) \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 2 \\ 0 & 0 & 0 & 1 & 3 \end{pmatrix}, (ii) \begin{pmatrix} 1 & 0 & 7/8 & 3/4 & 0 \\ 0 & 1 & 5/8 & -22/8 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}.$$

**14.**

$$(i) \begin{pmatrix} -7 & 2 \\ 4 & -1 \end{pmatrix}, (ii) \begin{pmatrix} 1/2 & 1/2 & -1/2 \\ -1/2 & 1/2 & 1/2 \\ 1/2 & -1/2 & 1/2 \end{pmatrix}, (iii) \begin{pmatrix} 1/5 & 0 & 0 \\ -3/35 & -1/7 & 0 \\ 41/35 & -5/7 & -1 \end{pmatrix}, (iv) \text{ Μη αντιστρέψιμος,}$$

$$(v) \text{ Μη αντιστρέψιμος, } (vi) \begin{pmatrix} 1/4 & 1/2 & -3 & 0 \\ -1/8 & 1/4 & -3/2 & 0 \\ 0 & 0 & 1/2 & 0 \\ 1/40 & -1/20 & -1/10 & -1/5 \end{pmatrix}.$$

**15.**  $c \in \mathbb{R} \setminus \{0, 1\}$ .