In the text, read sections §4.4 and §4.5 and do the Practice Problems. (In §4.4, the stuff about ellipses and hyperbolas is less important; what matters is Theorems 4.8 and 4.9.)

A few words about the book’s notation.
If $\mathcal{A}$ denotes a basis $\mathbf{a}_1, \ldots, \mathbf{a}_n$, and $\mathbf{v}$ is a vector, then $[\mathbf{v}]_{\mathcal{A}}$ refers to the coordinate vector of $\mathbf{v}$, that is, the vector whose entries are the coefficients of $\mathbf{v}$ when expressed in terms of $\mathcal{A}$. For example, $\mathbf{a}_1 = (1, 1)$ and $\mathbf{a}_2 = (1, -1)$ form a basis $\mathcal{A}$ for $\mathbb{R}^2$, and if $\mathbf{v} = (5, 3) = 4\mathbf{a}_1 + 1\mathbf{a}_2$, then $[\mathbf{v}]_\mathcal{A} = (4, 1)$.

Likewise, if $T : \mathbb{R}^n \to \mathbb{R}^n$ is a linear transformation, then $[T]_{\mathcal{A}}$ denotes what I called the $\mathcal{A}$-matrix of $T$, and what the book calls the matrix representation of $T$. If $\mathcal{A}$ is the standard basis, then this is the standard matrix of $T$.

With this understood, do the following exercises:
From §4.4, do 1, 2, 3, 12, 15, 16, 28, 57, 58, and 59.
From §4.5, do 1, 35, 37, 39, and 51.

Also do the following.
Say that square matrices $A$ and $B$ are similar if there is an invertible $S$ such that $A = SBS^{-1}$. That is, $A$ and $B$ represent the same linear transformation in different bases.

1. If $A$ and $B$ are similar, must $\det A = \det B$? Why or why not?
2. If $A$ and $B$ are similar, must $A^T$ and $B^T$ be similar? Why or why not?
3. If $A$ and $B$ are similar, use induction to show that $A^k$ and $B^k$ are similar for all $k \geq 0$.  
