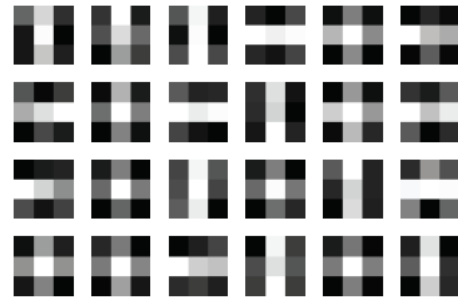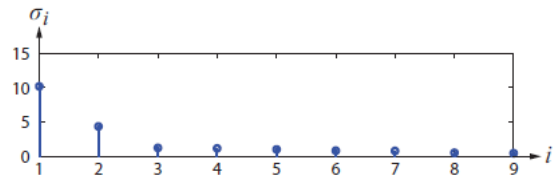**Concept Question 11-6:** Why do we set small singular values to zero?

To reduce the dimensionality of the problem. In the examples in Section 11-9.1 and 11-9.2, this practice reduced the dimensionality to two, so training images could be depicted as locations in a plane: Figs. 11-12 and 11-13.

(a) 24 training images, each (3×3) in size

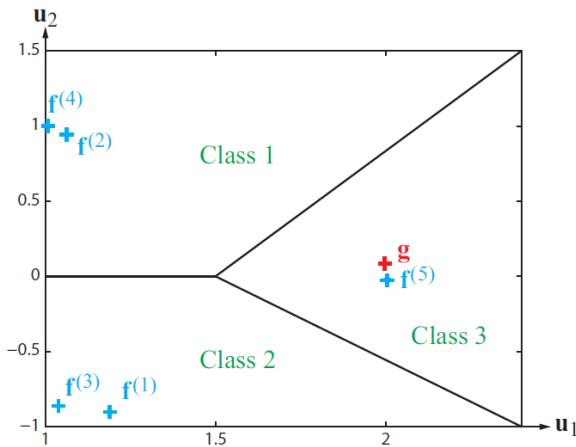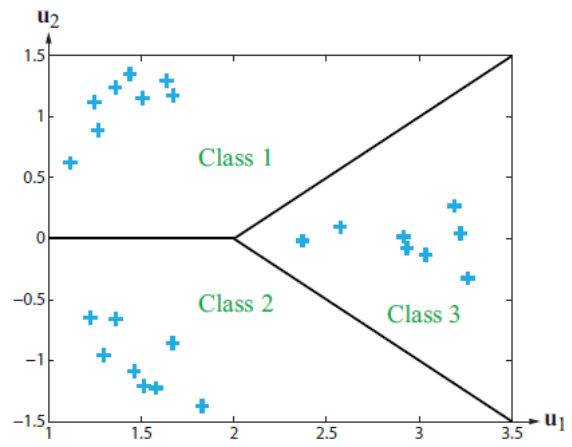(b) Singular values σ_i of the training matrix

Figure 11-12 Depiction of 2-D subspace spanned by $\mathbf{u}_1$ and $\mathbf{u}_2$. The blue ✚ symbols represent each column of the training matrix (i.e., each training image $f^{(i)}[n,m]$. They cluster into 3 classes. The red ✚ represents the observation image $g_{\mathrm{obs}}[n,m]$.

(c) Depiction of 2-D subspace spanned by $\mathbf{u}_1$ and $\mathbf{u}_2$. The blue ✚ symbols represent individual columns of the training matrix. They cluster into 3 classes.

Figure 11-13 (a) 24 training images, (b) plot of singular values, and (c) clusters of training images in $(\mathbf{u}_1, \mathbf{u}_2)$ space.