

Figure 37.2: The relationship between the closed unit balls centered at  $(0,0)$ .

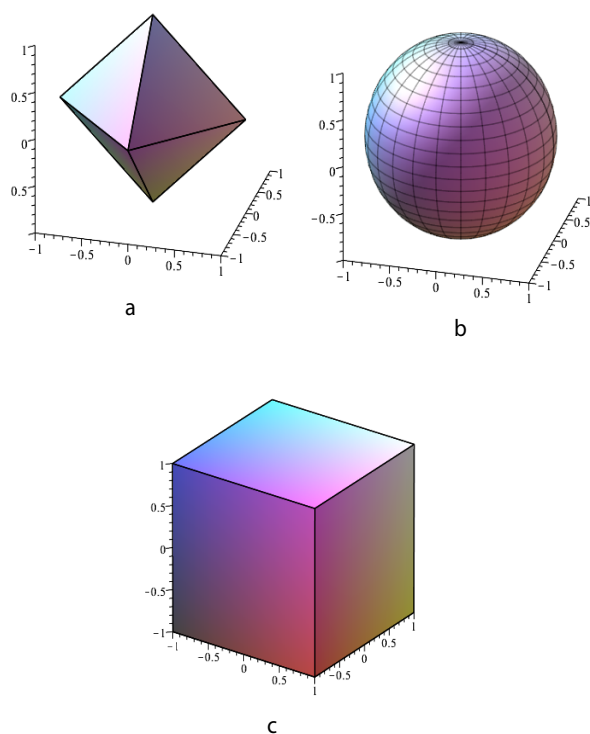


Figure 37.3: Figure (a) shows the octahedral shaped closed ball associated with  $\|\cdot\|_1$ . Figure (b) shows the closed spherical associated with  $\|\cdot\|_2$ , while Figure (c) illustrates the closed unit ball associated with  $\|\cdot\|_\infty$ .

In a normed vector space we define a closed ball or an open ball of radius  $\rho$  as a closed ball or an open ball of center  $0$ . We may use the notation  $B(\rho)$  and  $B_0(\rho)$ .

We will now define the crucial notions of open sets and closed sets, and of a topological space.