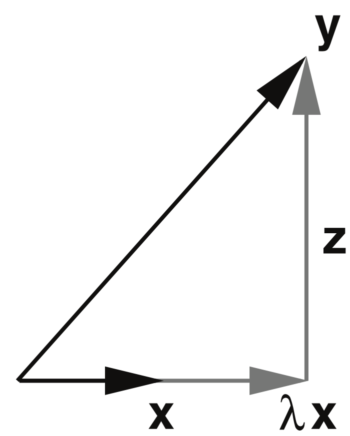

Figure 8.1: Illustration of the projection $\lambda\overline{x}$ of $\overline{y}$ along $\overline{x}$.

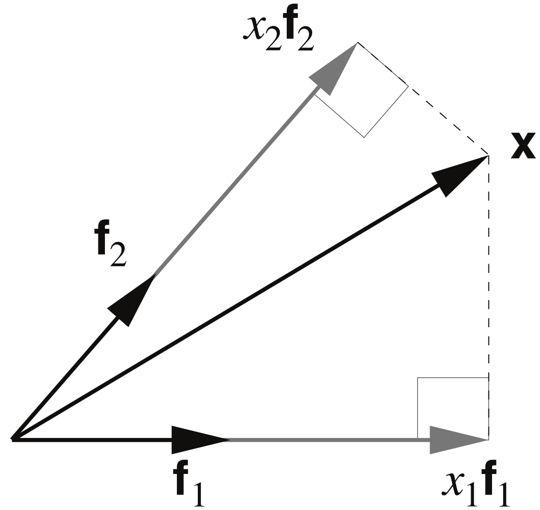

Figure 8.2: The covariant components x_1, x_2 of a vector $\mathbf{x} \in \mathbb{E}^2$. The basis vectors $\mathbf{f}_i$ have unit length.

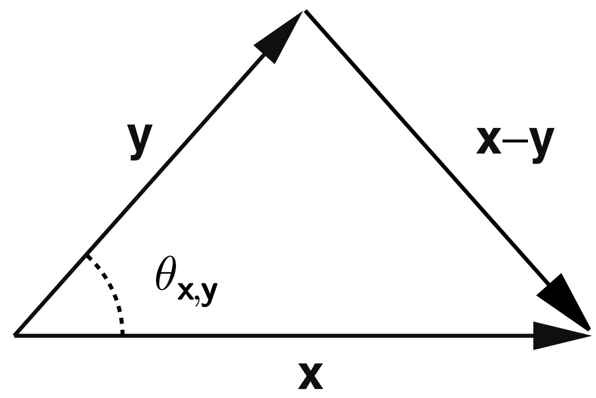

Figure 8.3: Illustration of the law of cosines.

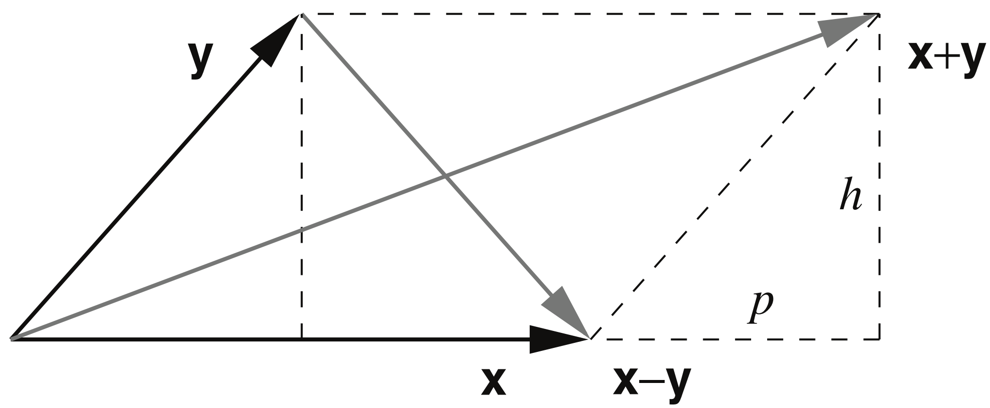

Figure 8.4: Illustration of the parallelogram law.

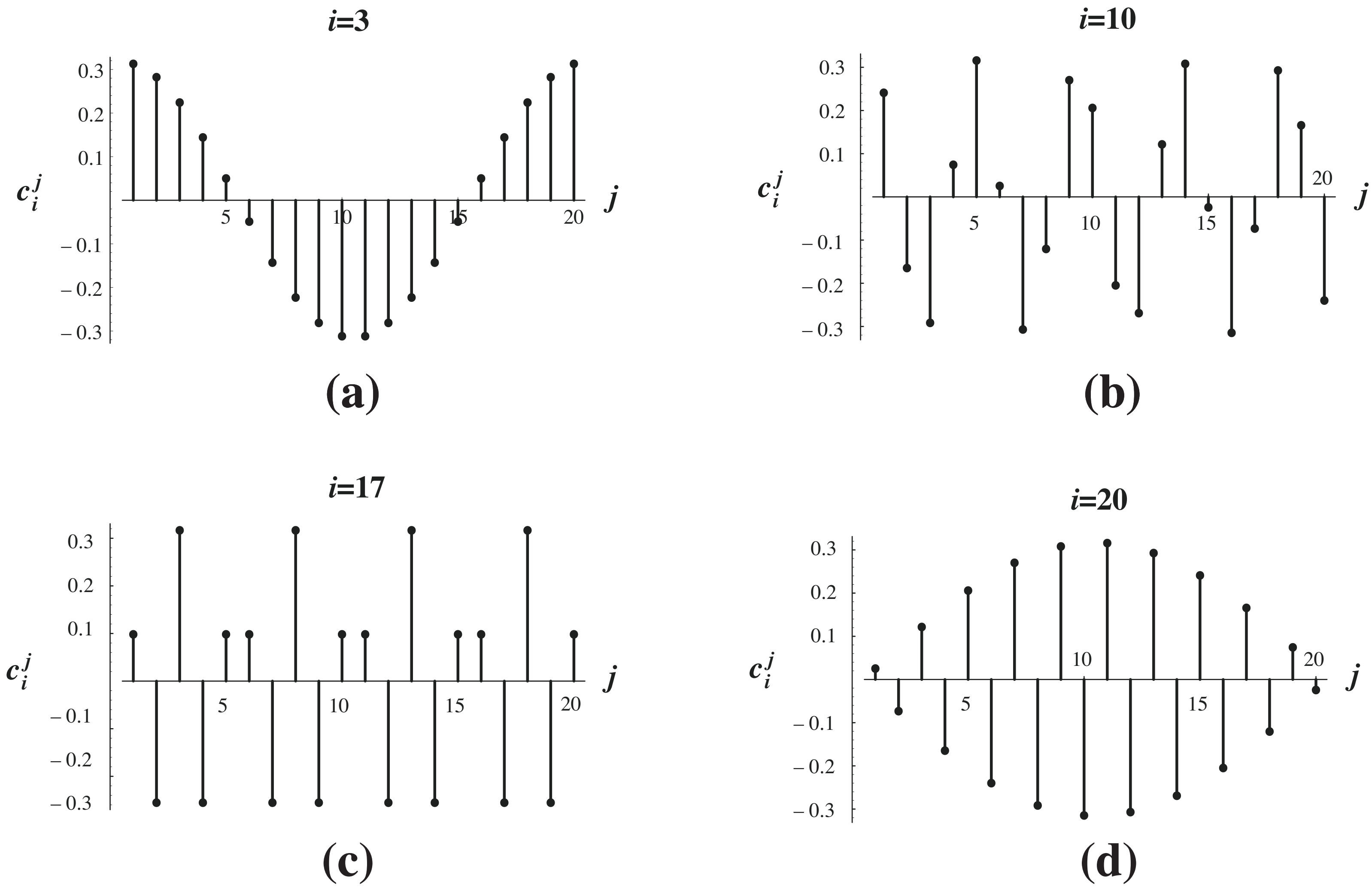

Figure 8.5: Illustration of the components c_i^j of several members of the cosine basis. (a) $i = 3$ (b) $i = 10$ (c) $i = 17$ (d) $i = 20$.

$$c_i^j := \begin{cases} \sqrt{\frac{2}{n}}\cos[(i-1)x_j], & \text{if } i > 1 \\ \frac{1}{\sqrt{n}}, & \text{if } i = 1 \end{cases}$$

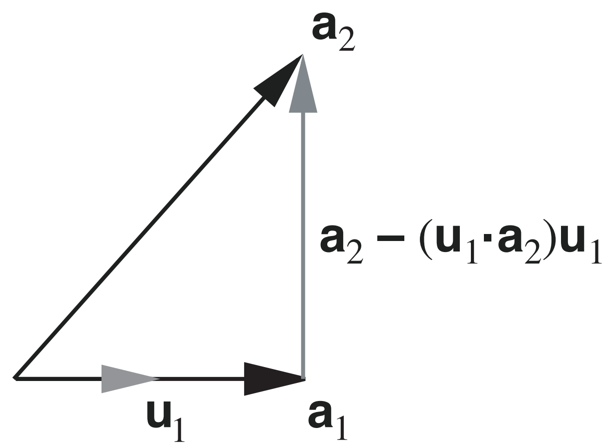

Figure 8.6: Illustration of the Gram-Schmidt construction in two-dimensional Euclidean space.

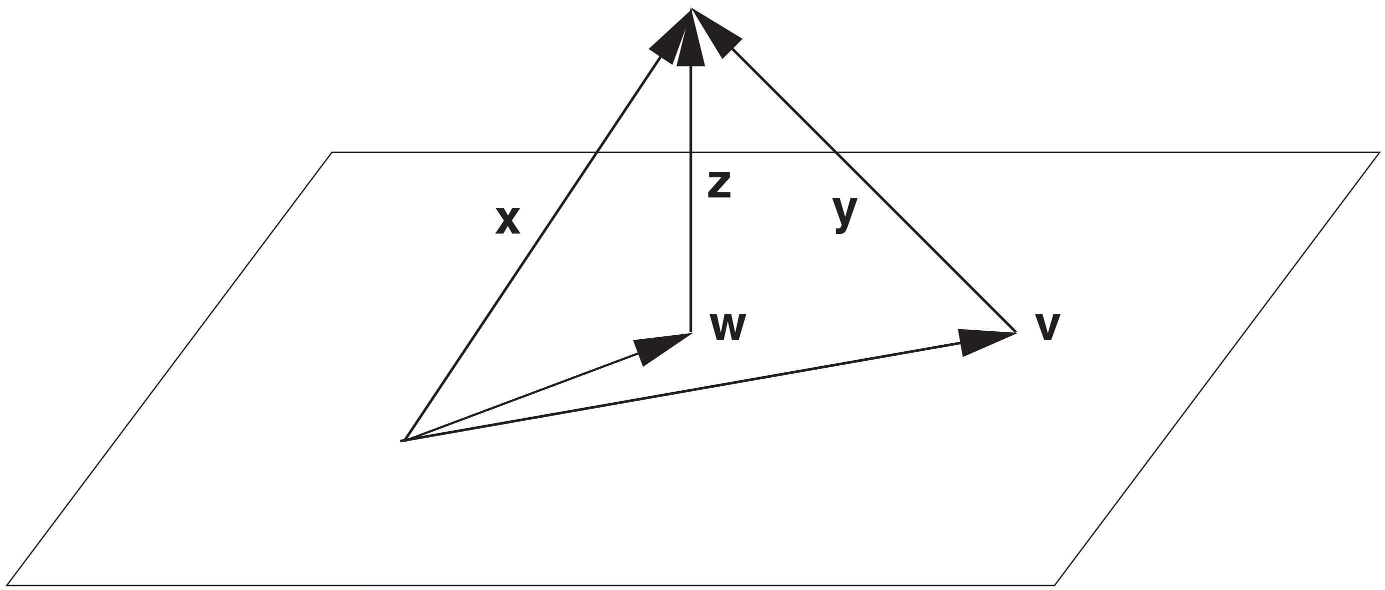

Figure 8.7: Orthogonal projection of a vector **x** on a vector subspace $\mathcal{W}$, represented here by a plane. Note that the orthogonal projection **w** is the best approximation to **x** by an element of $\mathcal{W}$.

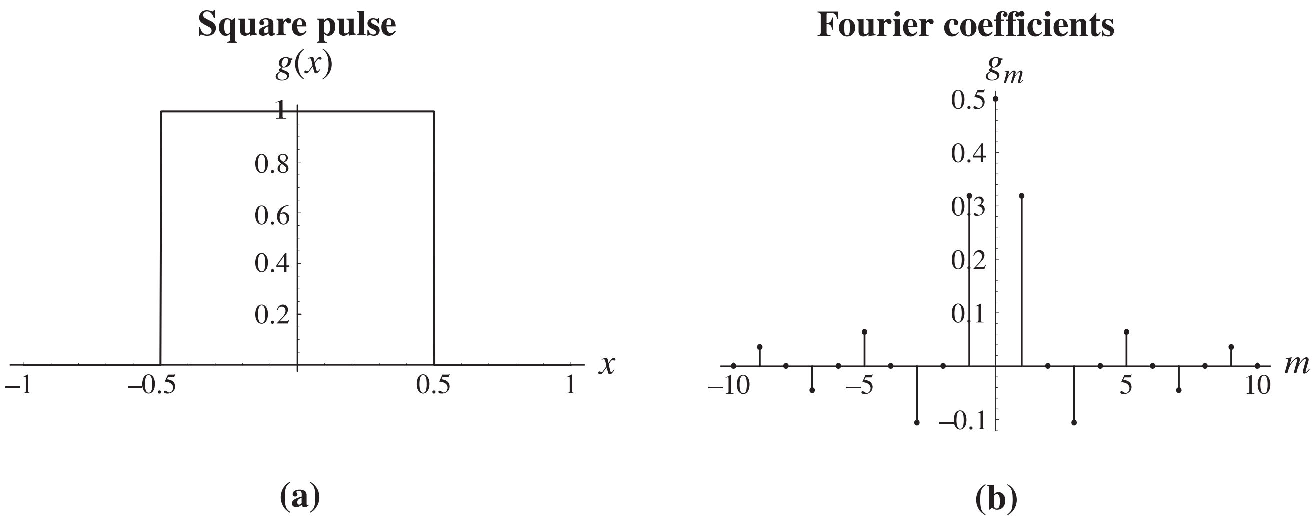

Figure 8.8: Illustration of the Fourier mapping. (a) The function g is a square pulse defined on the interval $[-1, 1]$. (b) A few of the terms of the sequence $\overline{g}$ of Fourier coefficients of (a).

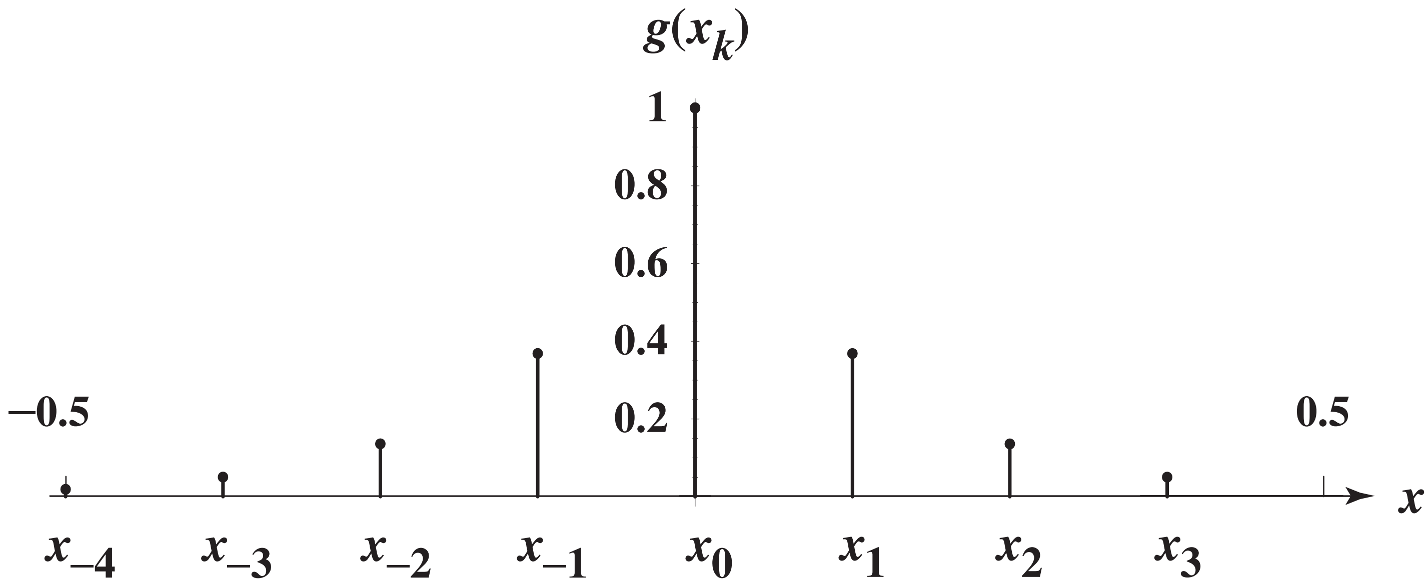

Figure 8.9: The function $g(x) = e^{-8|x|}$, sampled uniformly at $N = 8$ points on the interval $[-\frac{1}{2}, \frac{1}{2}]$.

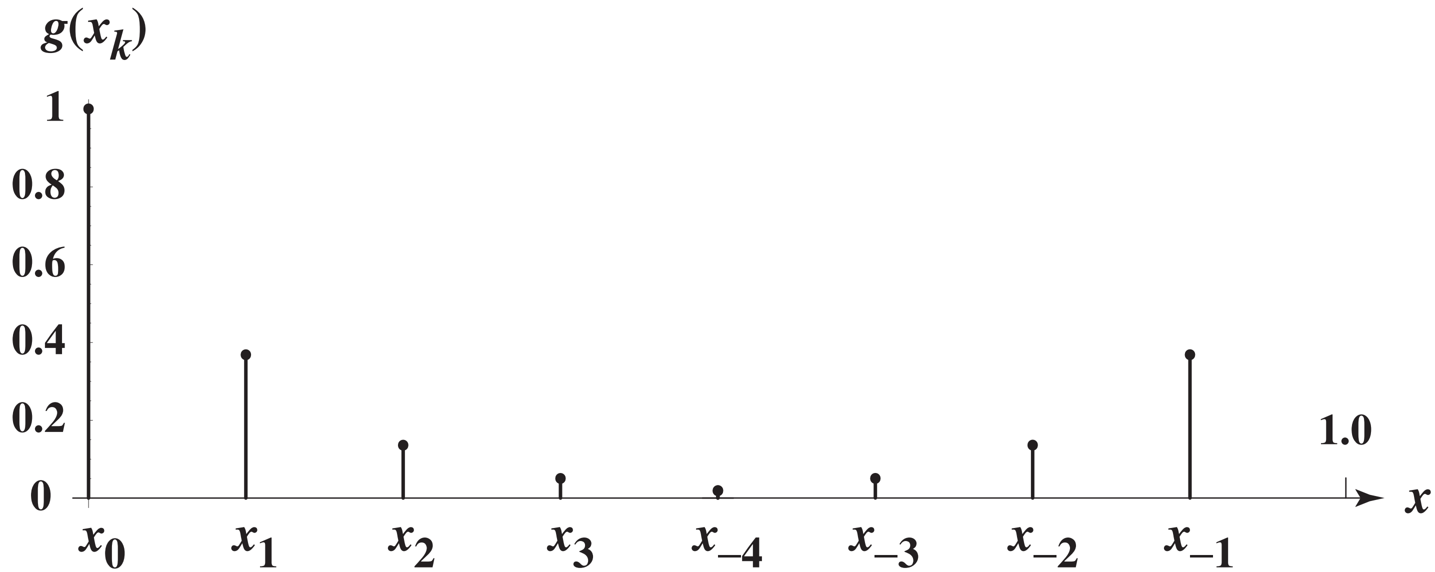

Figure 8.10: The function $g(x) = e^{-8|x|}$, sampled uniformly at $N = 8$ points on the interval $[0, 1]$. The values of g on the interval $[\frac{1}{2}, 1)$ have been obtained by periodicity from the values of g on the interval $[-\frac{1}{2}, 0)$.

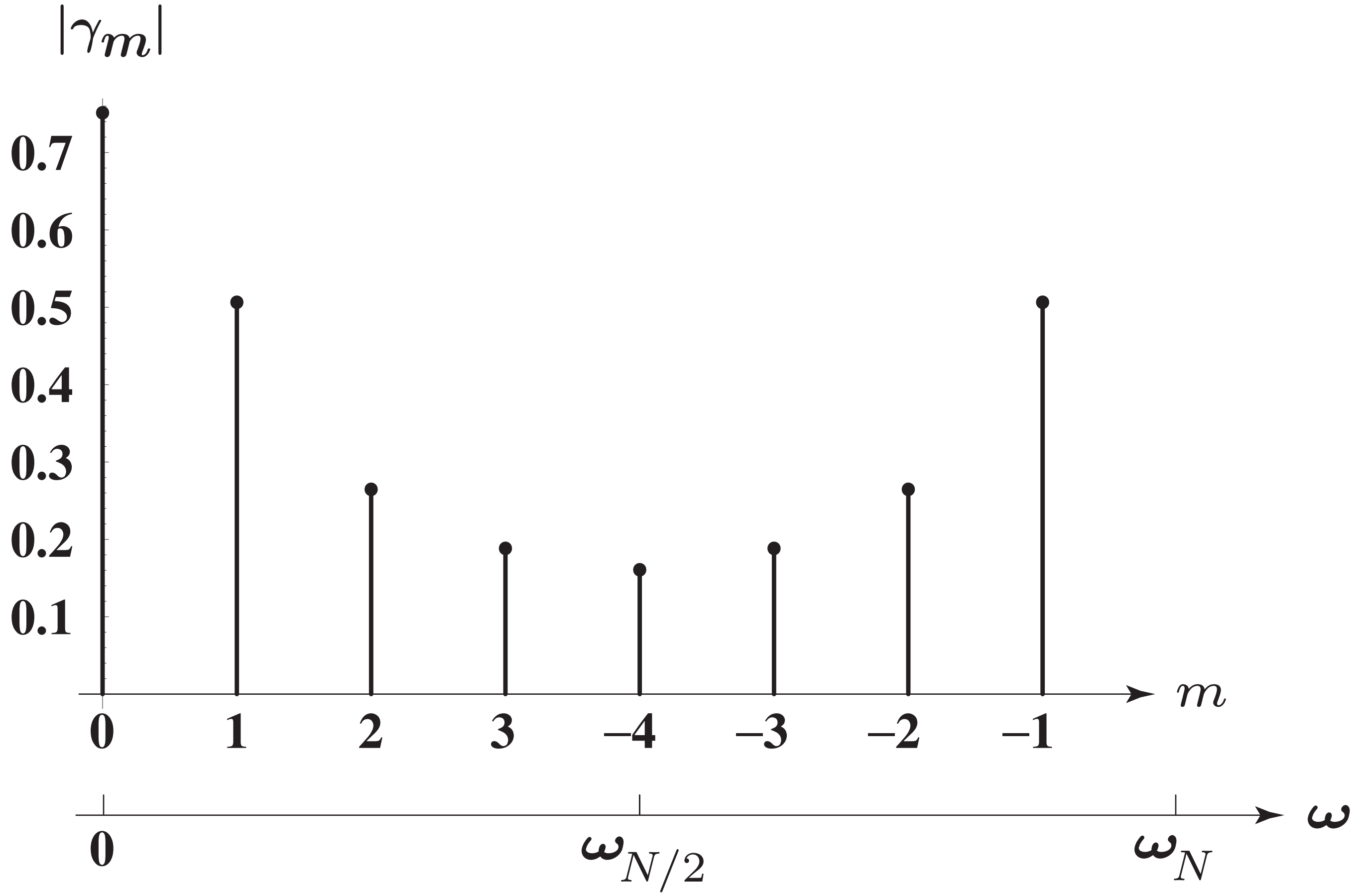

Figure 8.11: The modulus of the discrete Fourier transform of the function $g(x) = e^{-8|x|}$, as computed by the fast Fourier transform.

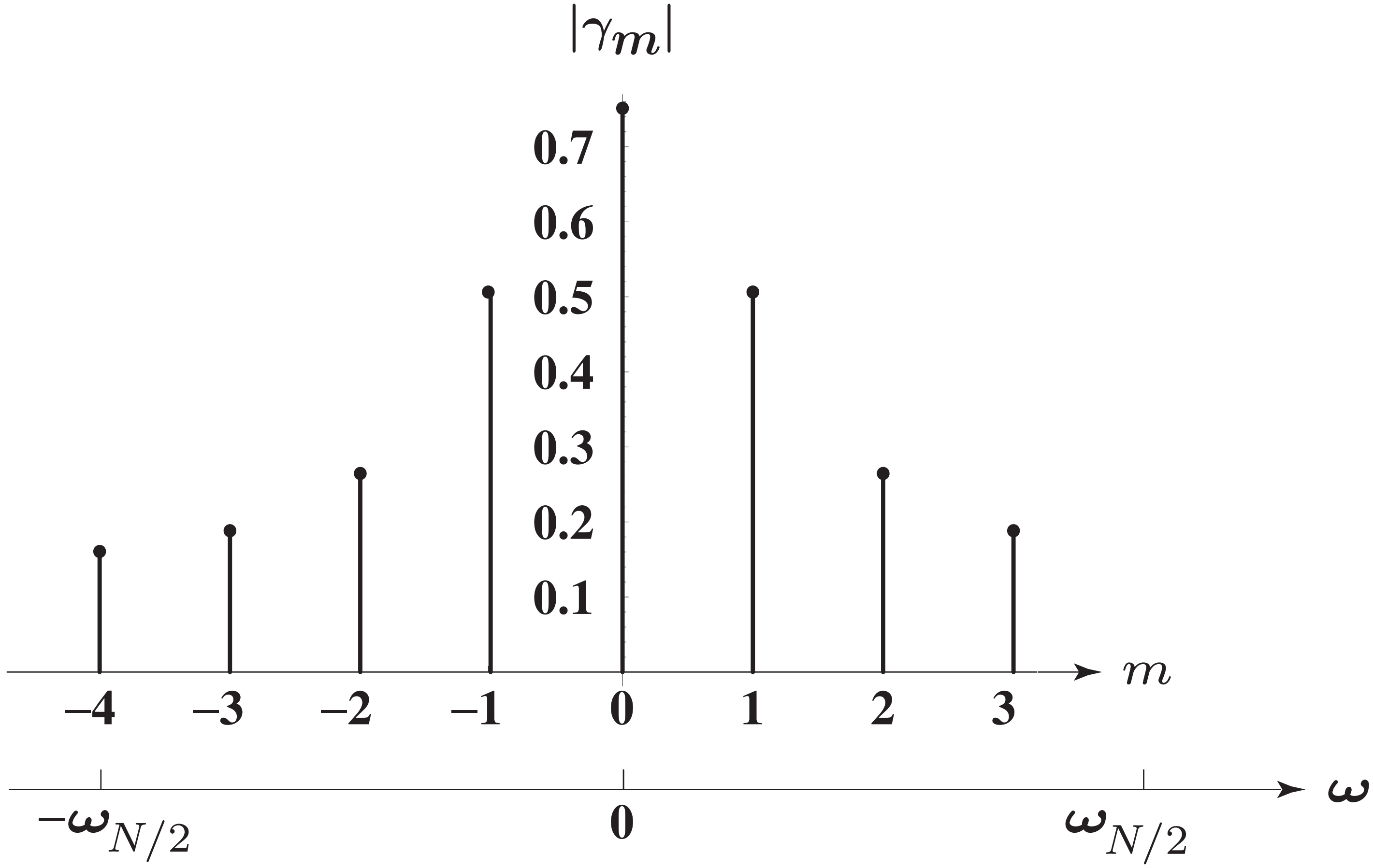

Figure 8.12: The modulus of the discrete Fourier transform of the function $g(x) = e^{-8|x|}$. The values of $|\gamma_m|$ on the interval $[-\frac{1}{2}\omega_N, 0)$ have been obtained by periodicity from the values of $|\gamma_m|$ on the interval $[\frac{1}{2}\omega_N, \omega_N)$.

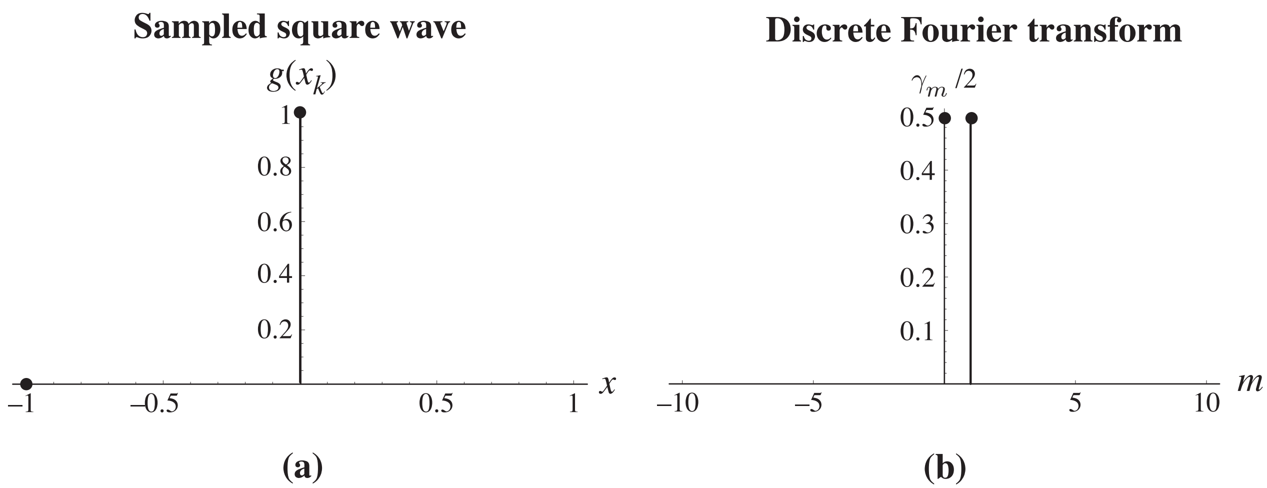

Figure 8.13: Illustration of the discrete Fourier transform of a square wave sampled at $N = 2$ points. (a) The values of $g(x_k)$. (b) The values of the discrete Fourier transform, $\gamma_m/2$, for the sampled values shown in (a).

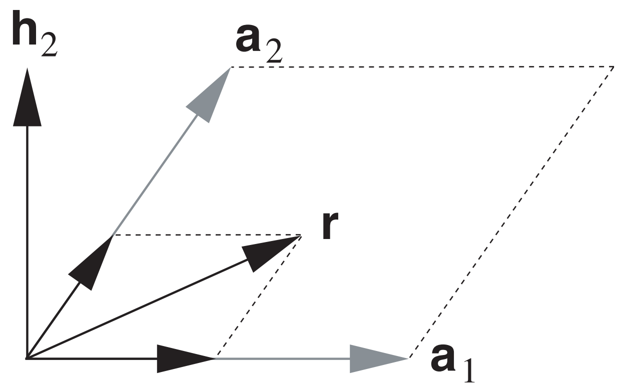

Figure 8.14: A 2-parallelepiped. The vector $\mathbf{r}$ belonging to the parallelepiped is equal to $t^1\mathbf{a}_1 + t^2\mathbf{a}_2$. The scalars t^1 and t^2 may independently take any values between 0 and 1.

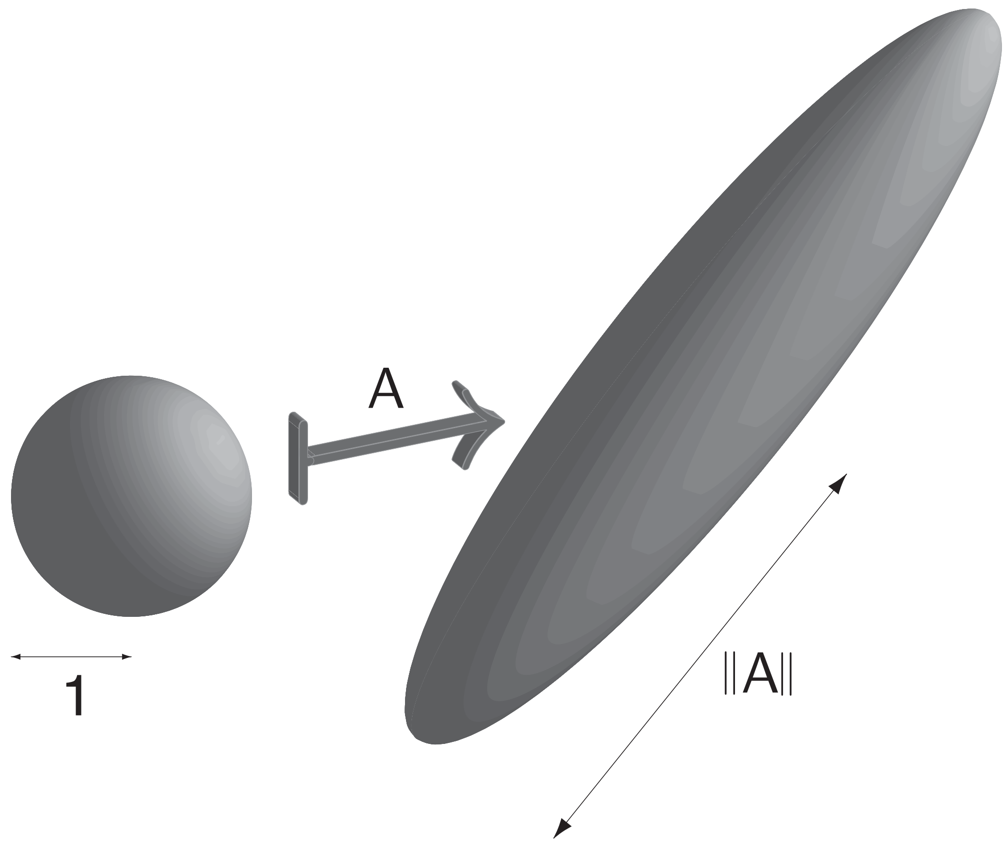

Figure 8.15: Illustration of the norm of a linear mapping in $\mathbb{R}^3$.