Example 1

(a) x₁[], signal being analyzed

Amplitude vs. Sample number

(b) x₂[], signal being analyzed

Amplitude vs. Sample number

(c) s₁[], basis function being sought

Amplitude vs. Sample number

(d) s₂[], basis function being sought

Amplitude vs. Sample number

(e) x₁[] × s₁[]

Amplitude vs. Sample number

(f) x₂[] × s₂[]

Amplitude vs. Sample number

FIGURE 8-8
Two example signals, (a) and (b), are analyzed for containing the specific basis function shown in (c) and (d). Figures (e) and (f) show the result of multiplying each example signal by the basis function. Figure (e) has an average of 0.5, indicating that x₁[] contains the basis function with an amplitude of 1.0. Conversely, (f) has a zero average, indicating that x₂[] does not contain the basis function.

In order for this correlation algorithm to work, the basis functions must have an interesting property: each of them must be completely uncorrelated with all of the others. This means that if you multiply any two of the basis functions, the sum of the resulting points will be equal to zero. Basis functions that have this property are called orthogonal. Many other