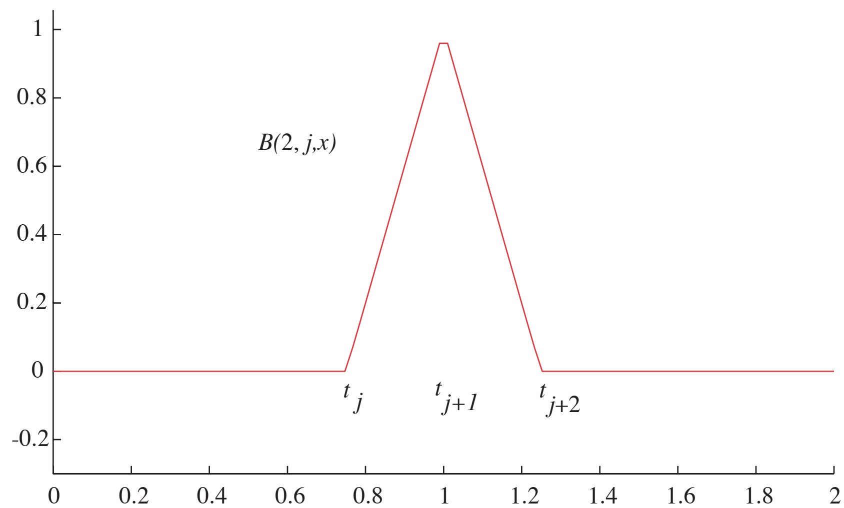

FIGURE 5-12

A B-spline of order 2, called the "hat" function

This makes the computation of B-splines very easy. To find the value of a B-spline of order m at θ, we just start with order 1 and keep multiplying and adding according to equation 5.14, until we reach order m. Furthermore most of the B-spline values will be zero. Here is what we mean:

Suppose it is desired to find a fifth order B-spline at t which is between the third and fourth knots. We want to find

$$B_{5,3}(t), \quad t_3 < t < t_4 \tag{5.15a}$$

According to equation 5.14, we must compute first

$$B_{4,3}(t), B_{4,4}(t) \tag{5.15b}$$

and for them we need all of the following

$$\begin{gathered} B_{3,3}(t), B_{3,4}(t), B_{3,5}(t) \\ B_{2,3}(t), B_{2,4}(t), B_{2,5}(t), B_{2,6}(t) \\ B_{1,3}(t), B_{1,4}(t), B_{1,5}(t), B_{1,6}(t), B_{1,7}(t) \end{gathered} \tag{5.15c}$$

But, an important point for the reader to notice, B-splines are local to the extent that

$$B_{m,j}(\theta)\begin{cases} = 0, & \theta \le t_j \\ \ne 0, & t_j < \theta < t_{j+m} \\ = 0, & \theta \ge t_{j+m} \end{cases} \tag{5.16}$$

and therefore, for the interval from knot j to knot $j + 1$, the only B-splines that contribute anything are