show that a_n approaches $1/n$, the filter-factor value for the equally-weighted case, and the filter memory no longer fades. For values of F between zero and one, the rate at which the filter memory fades decreases as F increases. The analyst can control the rate at which the filter memory fades by selecting an appropriate value of F.

As the number of points n increases, the value of a_n used in the recursive exponential-filter equation decreases continuously as it asymptotically approaches $1 - F$. For any given n, a larger a_n means more emphasis is placed on the current data point and less on previous points. That is, the larger the recursive filter factor a_n, the faster the filter memory fades. Filter factors for sample sizes up to 300 points are shown in Figure 36 for six different filters. Early in the data-index count (n less than 30), the filter based on index-number weighting has the fastest fading memory, since for 30 data points or fewer the filter has the largest filter factors. After 160 points or so, the index-weighted filter fades at a slower rate than the exponential filter with $F = 0.99$. Consequently, users of index-count-based fading filters frequently calculate a filter factor for some maximum value of n that is then applied to all subsequent data points as well. For example, if a maximum count of about 180 is used for n, this filter from that point on will behave similarly to the exponentially-fading filter with $F = 0.99$.

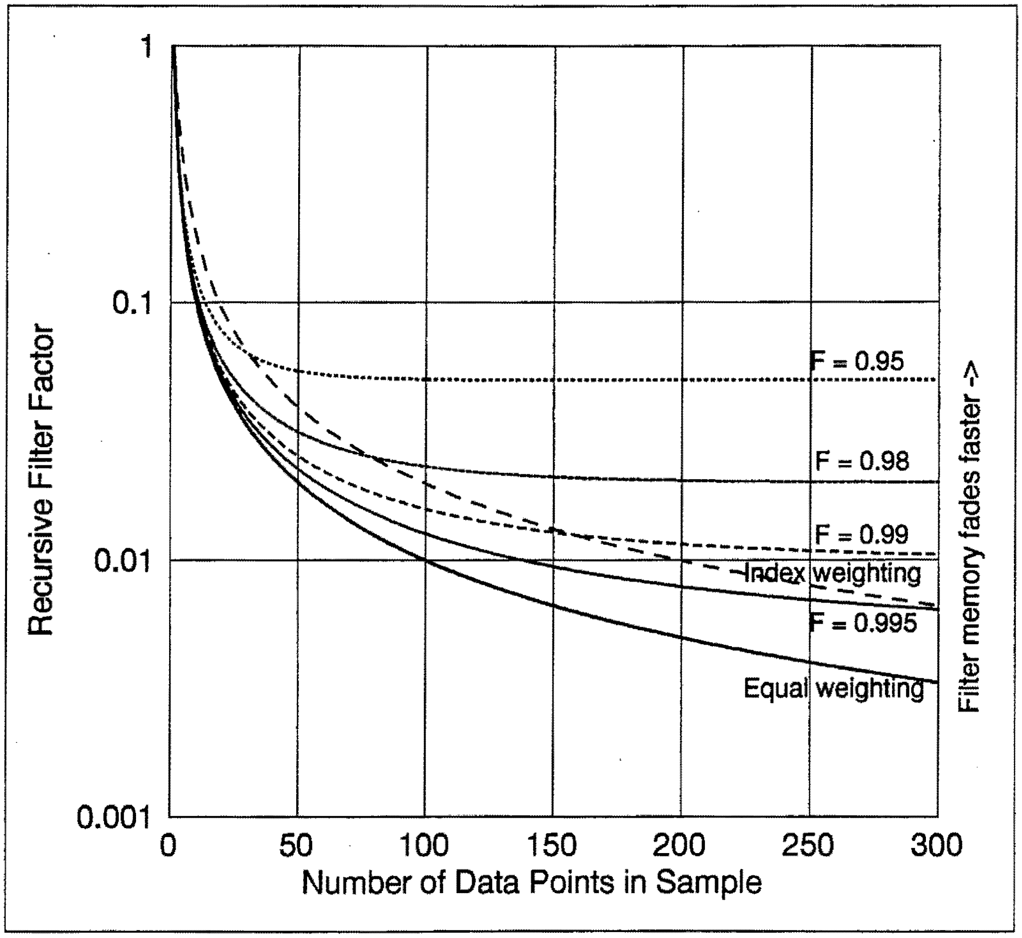

Figure 36. Recursive Filter Factor for Last Data Point