# 7.1

The system function of a discrete-time system is

1. Assume that this discrete-time filter was designed by the impulse invariance method with ; i.e., , where is real. Find the system function of a continuous-time filter that could have been the basis for the design. Is your answer unique? If not, find another system function .
2. Assume that was obtained by the bilinear transform method with Find the system function that could have been the basis for the design. Is your answer unique? If not, find another .

# 7.2

We wish to design an FIR lowpass filter satisfying the specifications

by applying a Kaiser window to the impulse response for the ideal discrete-time lowpass filter with cutoff Find the values of and *M* required to satisfy this specification.

# 7.3

Suppose that we wish to design a highpass filter satisfying the following specification:

The filter will be designed using the bilinear transformation and with a prototype continuous-time filter. State the specifications that should be used to design the prototype continuous-time filter to ensure that the specifications for the discrete-time filter are met.