## 信号与系统试题

1. Determine which of these properties hold and which do not hold for the following discrete-time system: 

where  denotes the system input and is the system output.

(a) Memoryless (b)Time invariant (c) Linear (d) Causal (e)Stable

2. Let 

1. Is  periodic? If it is, determine the fundamental period.
2. Deter mine and sketch 
3. Determine and sketch the even and old parts of 

3.The unit step response  is the output of an LTI system when the input is the unit step signal . Suppose that the unit step response  of an LTI system is as shown in Figure 1.

1. Determine and sketch unit impulse response  of the system.
2. Determine whether the system is causal and/or stable.
3. If the input of the system is as shown in Figure2, sketch the output 

 

Figure 1 Figure 2

4.Given the following facts about a periodic signal .

1.  is real;
2. The period of  is 4 and its Fourier coefficients are denoted as ;
3. ;
4. A real signal with Fourier coefficients is odd;
5. .

Determine all possible .

5.The following figure shows a series connection of an amplitude modulation and the corresponding demodulation. The carrier is given by .

When the input is given by ,

1. Determine the output .
2. Sketch the spectrum of  and the spectrum of 



Figure 3

6.Let  denote the Fourier transform of the signal  shown in Figure

1. Find 
2. Determine the expression of 
3. Find 



Figure 4

7.Consider the inverse of a causal LTI system  is, 

1. Determine the system  and sketch the pole-zero pattern of . Is this system  stable?
2. Determine the differential equation relating the input  and output  for system .
3. Draw the block diagram of the system 
4. Find the impulse response  of the system.

8.Consider the digital filter structure shown in Figure 5.

1. Find  for this causal filter.
2. For what values of the k is the system stable?
3. If , determine .
4. If  and , determine  for all .

Figure 5