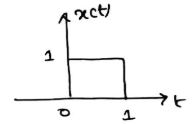
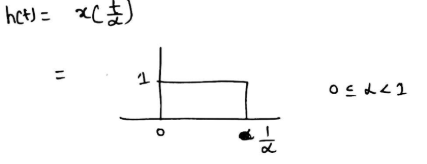
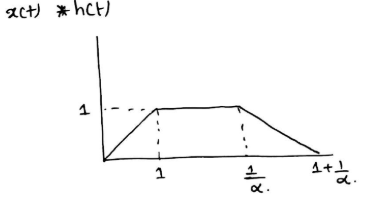
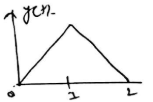
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Signals and Systems

October 22, 2019

Exam #1

1. We know:  
   1. For :  
      Since k only exists at 1,
   2. For :
   3. Let’s suppose that for :  
      For this system to be time invariant, it would mean that:  
      , then . But since , the system must be time variant.
2. Here, , where   
   Substituting, we get:  
   That is,
3. To determine and sketch y[t]=x[t]\*h[t], let’s first sketch x[t] and h[t], respectively:  
    = x[t]  
    = h[t]  
   1. Now, we can sketch y[t]=x[t]\*h[t]:  
       = y[t]
   2. From our sketch above, we can see that if contains only 3 discontinuities, then because our sketch would look like below:  
       = y[t], where
4. x[-1] = -1, x[0] = 0, x[1] = 1  
   v[0] = 1, v[1] = 1, v[2] = 1  
   This can be rewritten as:  
   So we can write the convolution y[n] = x[n]\*v[n]:  
   Substituting the values we receive from the original discrete time signals, we can solve for the convolution sum:  
   Finally, we can plot the result below:  
   