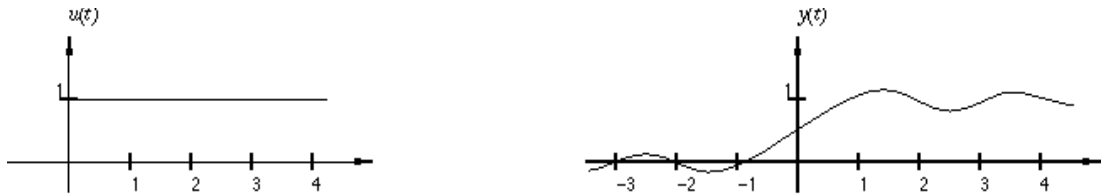


## INFO240 Signal Analysis and Processing - Assignment 3

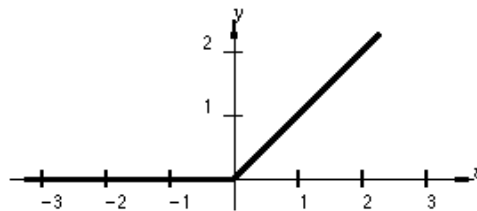
Submit your assignment to the INFO240 assignment box opposite E6A Room 247

### Signals

1. The input-output pair shown in following figure is the unit step response of an ideal low-pass filter. The filter is known to be linear and time invariant. Is it causal?

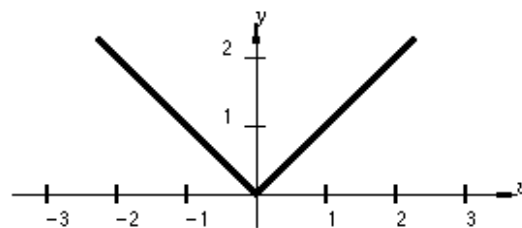


2. (a) Consider a system with its input and output related by the characteristic shown in the following figure. (This system is called a half-wave rectifier.)



If  $u(t) = \sin t$ , what is its output?  
What is the frequency of its output?  
Is the system memoryless?  
Is the system time invariant?

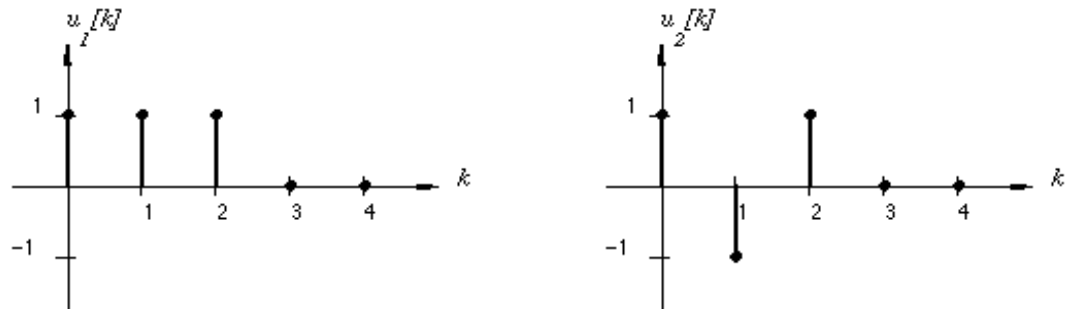
- (b) Consider a system with its input and output related by the characteristic shown in following figure. (This system is called a full-wave rectifier.)



If  $u(t) = \sin t$ , what is its output?  
What is the frequency of its output?  
Is the system memoryless or time invariant?

3. Consider an LTI discrete-time system. Suppose the zero-state response excited by the impulse sequence  $\delta[k]$  is  $h[k] = 0.5k, k = 0, 1, 2, \dots$

What are the zero-state responses excited by the input sequences shown in the following figure??




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A total of ten marks, one for each '?', will be awarded for this assignment.