**Signal Analysis Lab 4**

***To verify the commutative property of a discrete time LTI system***

**Commutative Property:**

x[n]\*h[n] ≡ h[n]\*x[n]

*h*[*n*]

*y*[*n*]=*x*[*n*]\**h*[*n*]

*x*[*n*]

*x*[*n*]

*y*[*n*]=*h*[*n*]\**x*[*n*]

*h*[*n*]

*Figure: Illustration of Commutative property of LTI System*

**Task #: Verify the commutative property of a discrete time LTI system in Matlab:-**

**Assume:**

**x[n] =**

**h[n] =**

Then

y1[n] = x[n]\*h[h]

y2[n] = h[n]\*x[h]

Show y1[n] = y2[n] = y[n]

***Matlab Code:***

**x=[0,1/3,2/3,3/3,4/3,5/3,6/3]**

**n1=[0,1,2,3,4,5,6]**

**nx=length(x)**

**h=[1,1,1,1,1]**

**n2=[-2,-1,0,1,2]**

**nh=length(h)**

**y1=conv(x,h)**

**y2=conv(h,x)**

**nmin=min(min(n1),min(n2))**

**n=nmin:1:nx+nh-2+ nmin**

**subplot(2,1,1)**

**stem(n,y1)**

**xlabel('n')**

**ylabel('y\_1=x\*h')**

**subplot(2,1,2)**

**stem(n,y2)**

**xlabel('n')**

**ylabel('y\_2=h\*x')**

**Output:**

