**Lab 1：Introduction**

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| **Introduction**  In this Lab, we learned how to use matlab to analysis the signals, and we will use matlab to write functions in the Discrete-time System and to explore the functions' property. And below are the requirements of this lab assignment:  1. Try to analysis the system's property.  2. Try to construct some input signal and use them to test the system's property.  **Lab results & Analysis**：  Problem 1.5      function y = diffeqn(a,x,yn1)  x\_len = length(x);  y = zeros(x\_len,1);  y(1) = a\*yn1 + x(1);  if x\_len >= 2  for i=2:x\_len  y(i) = a\*y(i-1)+x(i)  end  end  end    图表, 直方图  描述已自动生成  In fig 1.5 b impulse, we apply the to the function and we got the output which is y[n] = 1.  In fig 1.5 b unitstep, we apply the to the function and we got the output which is y[n] = n.    图表  中度可信度描述已自动生成  The reason is that we have y[-1] = -1 in the differential function. So, we got and , so the system is not linear, so the difference is not zero.    图表  描述已自动生成  The first figure is y[-1] = 0,and the second figure is y[-1] = 0.5. We found that y[n] gradually close to 2.  We have  So for and the only difference at each item is which will decrease as n increase while |a|<1.  Code  1.5  **a.**  function y = diffeqn(a,x,yn1)  x\_len = length(x);  y = zeros(x\_len,1);  y(1) = a\*yn1 + x(1);  if x\_len >= 2  for i=2:x\_len  y(i) = a\*y(i-1)+x(i)  end  end  end  **b.**  close all;  clc;  t = [0:30];  impulse = t==0;  unitstep = t>=0;  out1 = diffeqn(1,impulse,0);  out2 = diffeqn(1,unitstep,0);  subplot(2,1,1);  stem(t,out1,'r--');  title('1.5 b impulse');  xlabel('x1[n]=δ[n]');  subplot(2,1,2);  stem(t,out2,'g--');  title('1.5 b unitstep');  xlabel('x2[n]=u[n]');  saveas(gcf,'1\_5\_b.png');  **c.**  close all;  clc;  t = [0:30];  x1 = t>=0;  x2 = 2 \* x1;  y1 = diffeqn(1,x1,-1);  y2 = diffeqn(1,x2,-1);  subplot(3,1,1);  stem(t,y1,'r--');  title('1.5 c y1');  subplot(3,1,2);  stem(t,y2,'g--');  title('1.5 c y2');  y3 = 2 \* y1-y2;  subplot(3,1,3);  stem(t,y3,'b--');  title('1.5 c y3');  saveas(gcf,'1\_5\_c.png');  **d.**  close all;  clc;  n=[0:30];  x=n>=0;  a=0.5;  yn1=0;  y1=diffeqn(a,x,yn1);  yn1=0.5;  y2=diffeqn(a,x,yn1);  subplot(2,1,1);  stem(n,y1,'r--')  title('1.5 (d) y[-1]=0');  subplot(2,1,2);  stem(n,y2,'b--');  title('1.5 (d) y[-1]=0.5');  saveas(gcf, "1\_5\_d.png")  **Note**: Please indicate meaning of the symbols in all expressions. Please indicate the coordinate and unit in all figures. | |
| **Experience**  You can write your experience with this project. Any comment and suggestion on this course are also very welcome. | |
| **Score** |  |