a) Determine the signal periodic of sequence  $X(n)=A\omega s(\frac{5\chi}{7}n+\frac{\chi}{3})$  . 14 [4 marks]

- b) Determine if the system **y(n)=Axin)** +b is a linear system. Non-Linear (No)
- c) Determine if the system  $y(n) = x^{2}(n)$  is a linear system. \_\_nonlinear/not\_\_.

Determine if the system  $y(n) = \sum_{n=1}^{n} x(n)$  is time-invariant system \_ not time-invariant/no\_.

Determine if the system  $y(n) = a^n u(n)$ , h(n) = u(n) {u(n) = 1,  $n \ge 0$  u(n) = 0, n < 0} is a

causal system. \_\_casual \_\_and if the system is a stable system\_\_not stable \_\_(8 marks)

d)

## Question 2 [16 marks]

For each of the following discrete-time systems, where y(n) and x(n) are, respectively, the output and the input sequences, determine whether or not the system is (1) linear, (2) time shift-invariant, (3) causal and (4) stable.

## i) y(n)=nx(n)

Solution:

nonlinear[2 marks], not time shift-invariant[2 marks], causal[2 marks], not stable[2 marks].

## ii) 从(n)=2X(n)+3

Solution:

2(A 
$$x_1[n]$$
?? +B  $x_2[n]$ ) ?+3 $\neq$  A( )+B( )
so it is not linear. [2 marks]
if  $x[n]=x[n$ ? –  $n_0$ ]
then =2 $x[n$ ? –  $n_0$ ] +3= $y[n$ ? –  $n_0$ ]
so it is time-invariant. [2 marks]

Since there is no output before the input hence the system is **causal**. [2 marks] if x[n] is a bounded input

y[n] is a bounded output. So it is **stable**.

[2 marks]

习题2.1 2.2 2.5 2.6 2.7