— Discreate Time

1) Takes the same values for w_0 values at multiples of 2π.

2) Periodic only for $w_0 = \frac{2\pi m}{N}$, $N \longrightarrow$ # of signals

3) $T = \frac{2\pi}{|w_0|} \cdot m$

Example

$$x[n] = 1 - \sum_{k=3}^{\infty} \delta[n-1-k]$$ express this signal in terms of step functions

$$\boxed{u[n] = \sum_{k=0}^{\infty} \delta[n-k] \text{ is already known.}}$$

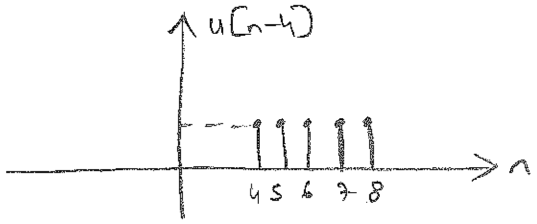
Lets say $k' = k-3$ then $x[n] = 1 - \sum_{k=0}^{\infty} \delta[n-1-k'-3]$

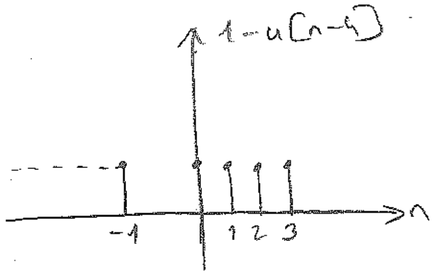
$$x[n] = 1 - \sum_{k=0}^{\infty} \delta[n-4-k']$$ Lets say $n-4 = n'$

$$x[n] = 1 - \sum_{k=0}^{\infty} \delta[n'-k']$$

$$x[n'+4] = 1 - \sum_{k=0}^{\infty} \delta[n'-k'] = 1 - u[n']$$ by substituting the terms back

$$\boxed{x[n] = 1 - u[n-4] = u[-n+3]}$$





CONTINUOUS AND DISCREATE TIME SIGNALS

In a system a continuous time or discreate time is taken as an input and the output is generated in the same format (continuous/discreate)

$x(t)/x[n] \longrightarrow$ System $\longrightarrow x(t)/x[n]$

input $x_1 \longrightarrow$ System 1 $\xrightarrow{x_2 = y_1}$ System 2 $\xrightarrow{y_2}$

$$S1: \; y_1[n] = 2x_1[n] + 4x_1[n-1]$$
$$S2: \; y_2[n] = x_2[n-1] + \frac{1}{2} x_2[n-3]$$