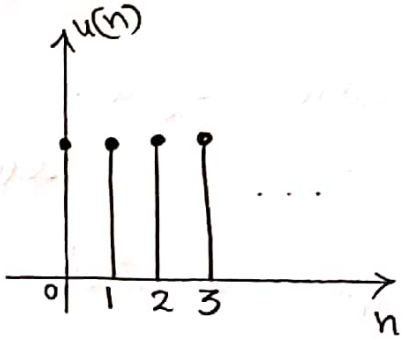
Discrete time Signal :-

Unit Step Function :-

It has the amplitude of '1' for all +ve values of independent variables and it has amplitude of '0' for all -ve values of independent variable.

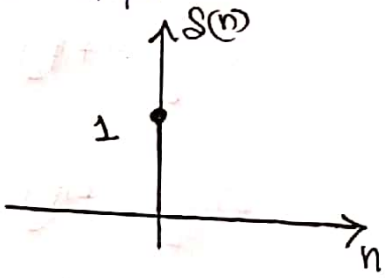
$$u(n) = \begin{cases} 1, & n \geq 0 \\ 0, & n < 0 \end{cases}$$



Unit Impulse (or) Delta function (or) Unit Sample function.

It has the amplitude of '1' only at $n=0$ and amplitude of '0' only at $n \neq 0$

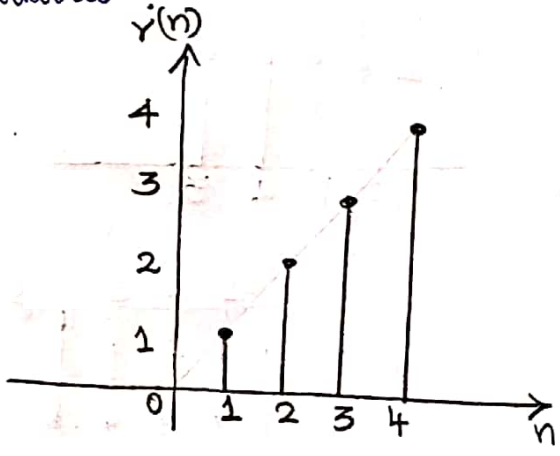
$$\delta(n) = \begin{cases} 1 & \text{for } n=0 \\ 0 & \text{for } n \neq 0 \end{cases}$$



Unit Ramp function :-

It is linearly growing function for all positive values of independent variables

$$r(n) = \begin{cases} n, & n \geq 0 \\ 0, & n < 0 \end{cases}$$



Complex Exponential Signal :-

when exponent is purely imaginary then the signal is said to be complex exponential signal

$$x(n) = e^{j\omega_0 n}$$

Sinusoidal signal :-

$$x(n) = \cos[\omega_0 n + \phi]$$

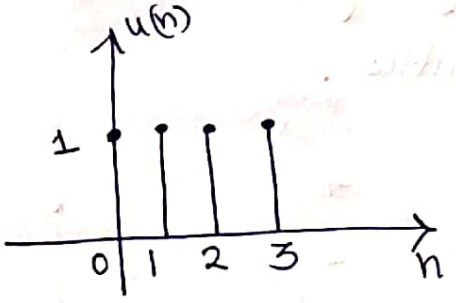
complex exponential can be written interms of sinusoidal signals as $x(n) = e^{j\omega_0 n} = \cos\omega_0 n + j \sin\omega_0 n$

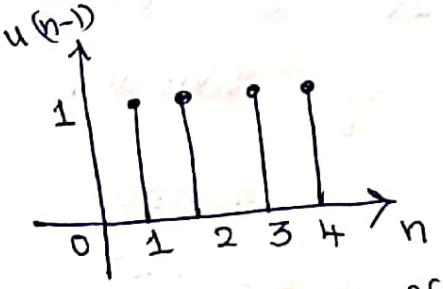
Sinusoidal signal can be written interms of complex exponential

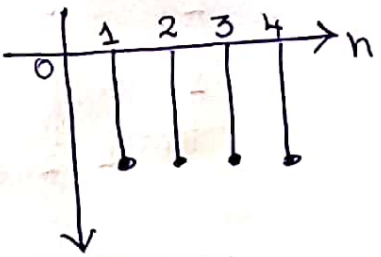
$$\cos[\omega_0 n + \phi] = \frac{e^{j[\omega_0 n + \phi]} + e^{-j[\omega_0 n + \phi]}}{2}$$

$$\sin[\omega_0 n + \phi] = \frac{e^{j[\omega_0 n + \phi]} - e^{-j[\omega_0 n + \phi]}}{2j}$$

Draw the signal :- $u(n) - u(n-1) = \delta(n)$







$-u(n-1)$