$x[n] : 1\ 2\ 3\ 2\ 8$

$h[n] : 0\ 0\ 1\ 0\ 0$

$x[n] * h[n] =$

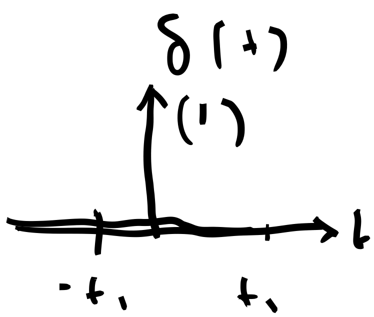
	1	2	3	2	8
0	0	0	0	0	0
0	0	0	0	0	0
1	1	2	3	2	8
0	0	0	0	0	0
0	0	0	0	0	0

$y[n] = 0\ 0\ 1\ 2\ 3\ 2\ 8\ 0\ 0$

unit sample sequence.

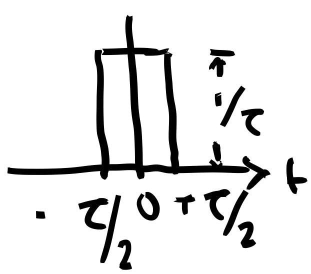
$\delta[n] = 1$ if $n = 0$

$= 0$ otherwise



$$\int_{-\infty}^{\infty} \delta(t)\, dt = 1$$ (unit impulse)

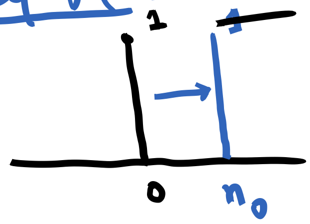
$\delta(t) = \infty$ at $t = 0$



Area $= \frac{1}{\tau} \times \tau = 1$

$\tau \to 0$ Area $= 1$

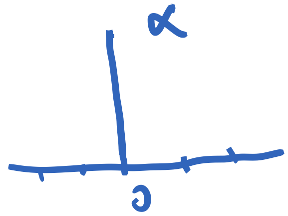
Shifted $\delta(n)$



$\delta[n]$

$$\delta(n-n_0) = 1 \quad \text{at } n = n_0$$
$$= 0 \quad \text{otherwise.}$$

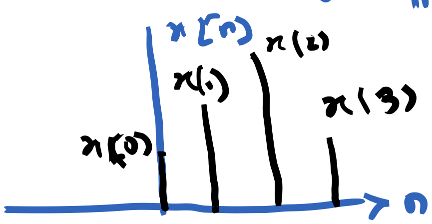
scaled $\delta[n]$



$$\alpha\delta(n) = \alpha \quad n = 0$$
$$= 0 \quad \text{otherwise.}$$

Scaled & Shifted $\delta(n)$:-

$$\alpha\delta(n-n_0) = \alpha \quad \text{at } n = n_0$$
$$= 0 \quad n \neq n_0$$



$$x[n] = x[0]\,\delta[n] + x(1)\,\delta(n-1) + x(2)\,\delta(n-2) + x(3)\,\delta(n-3)$$

0 0 1 0 0

1 2 3 4 8

9 4 3 2 1

$$x[n] = \sum_{k=-\infty}^{\infty} x(k)\,\delta(n-k)$$

$$\sum x(k)\,h(n-k)$$

$$\sum_{k=-\infty}^{\infty} x(k)\,\delta(\underline{n+k}) = x[-n]$$

$$\sum_{k=-\infty}^{\infty} x(k)\,\delta(-k-n) = x[-n]$$

$$-k-n=0$$

$$k=-n$$

$$x(n) \longrightarrow \boxed{\begin{matrix}\text{system}\\ \delta(n)\end{matrix}} \longrightarrow x(n) * \delta(n) = x(n)$$

$$\delta(n) \longrightarrow \boxed{\text{system}} \longrightarrow h(n)$$: unit sample response of the system.

$$x(n) \longrightarrow \boxed{h(n)} \longrightarrow x(n) * h(n) = y(n)$$

$$y(n) = \sum_{k} x(k)\,h(n-k)$$