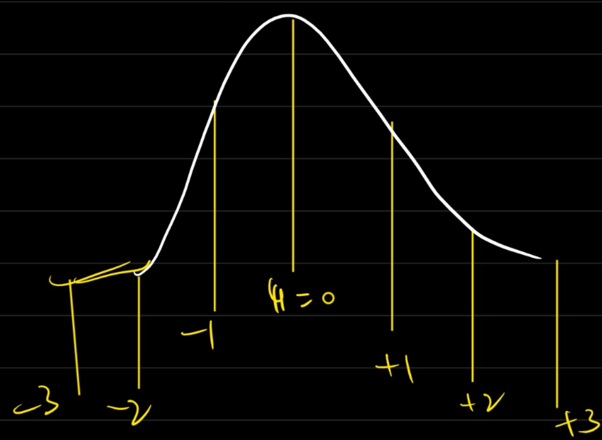
Standard Normal distribution

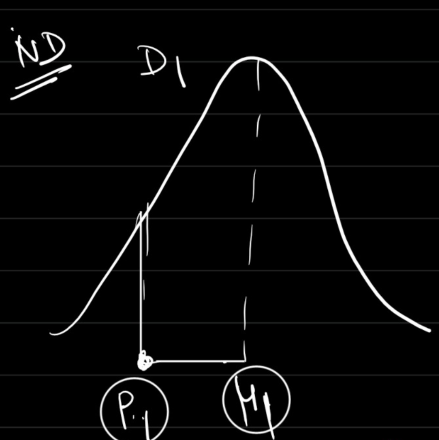
mean $= \mu$, std dev $= \sigma$ $\Big\} \rightarrow \mu$ & σ can be any value.

→ SND is continuous prob distⁿ

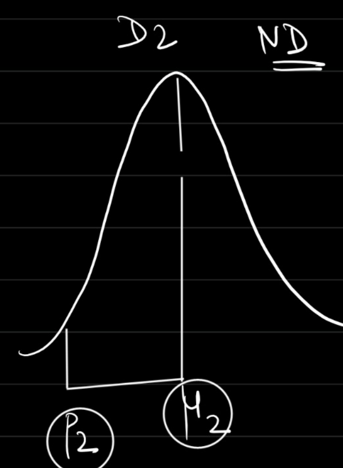
→ A special case of ND ⟶ $\mu = 0, \sigma = 1$



Why SND if we have already ND ?



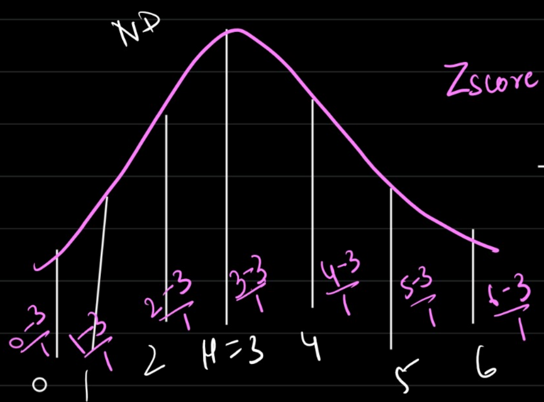
Can I say P_1 is closer to μ_1 of D1 and compared to P_2 of D_2 (μ_2)



* you can not compare Science stream topper to Arts stream topper.

On the scale of μ & σ
$\qquad\qquad\qquad\qquad \| \quad \|$
$\qquad\qquad\qquad\qquad 0 \quad 1$

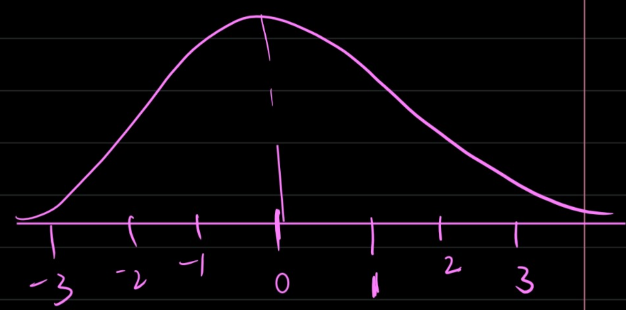
ND $\longrightarrow$ Standard ND



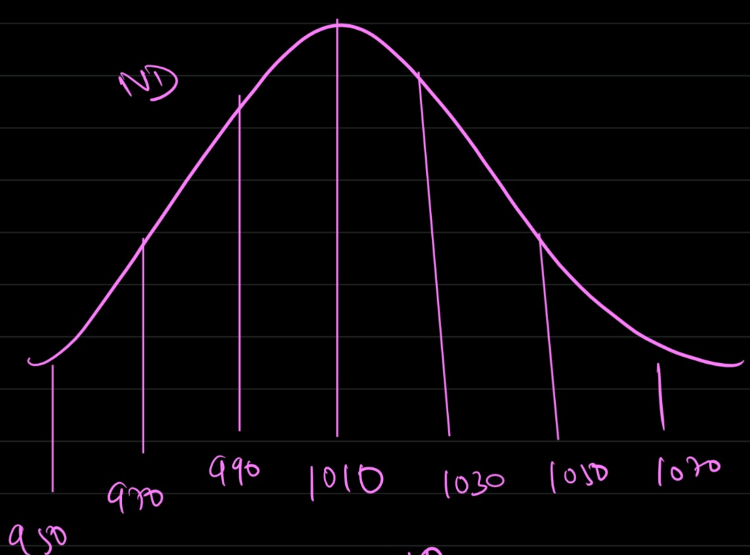
$\mu = 3$
$\sigma = 1$

$$\text{Zscore} = \frac{x-\mu}{\sigma}$$

$\longrightarrow$

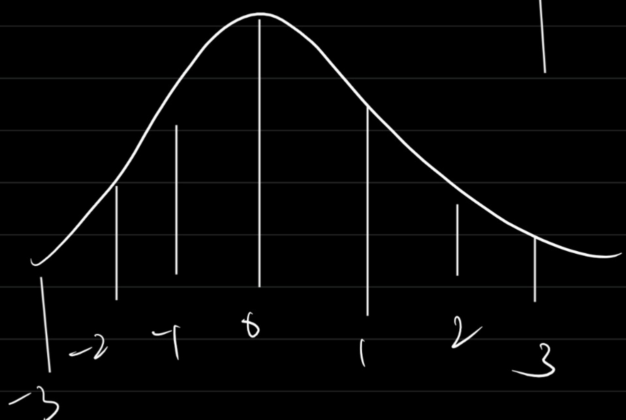


* $\boxed{\begin{array}{l} N(\mu,\sigma) \\ SND(\mu=0,\sigma=1) \end{array}}$

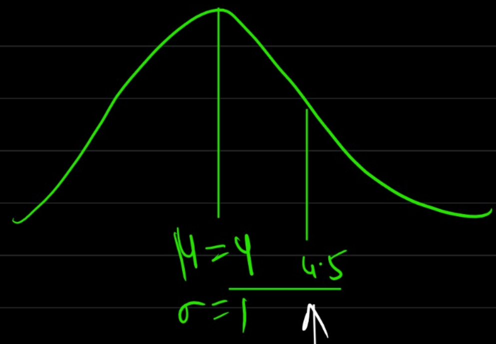


$\mu = 1010$
$\sigma = 20$

x	$x-\mu$	$\frac{x-\mu}{\sigma}$	
950	950-1010 = -60	-3	$\left(\frac{60}{20}\right)$
970	970-1010 = -40	-2	$\left(\frac{40}{20}\right)$
990	990-1010 = 20	-1	
1010	1010-1010 = 0	0	
1030	1030-1010 = 20	1	
1050	1050-1010 = 40	2	
1070	1070-1010 = 60	3	



Q.



How many standard deviation 4.5 is away from mean?

$$Z_{score} = \frac{x - \mu}{\sigma} = \frac{4.5 - 4}{1} = 0.5$$

0.5 Std dev away from its own mean.

* Use Case

→ Many of the machine learning Algo like linear Reg, Logistic Reg, clustering requires Scaling. → faster Computation.

$3 \times 2 = 6$

658×920

→ Standardization $\left(Z_{score} = \frac{x - \mu}{\sigma} \right)$

eg.

No of rooms	Area of house	distance from airp	y (Price of house lakhs)
1	1100		
2	1200	20	70
3	1500	30	80
4	1250	40	90
5	-	-	-
-	-	-	-
-	-	-	-

$$\boxed{Z_{score} = \frac{x - \mu}{\sigma}}$$

$$= \frac{x_i - \mu_{area\ of\ hous}}{\sigma}$$