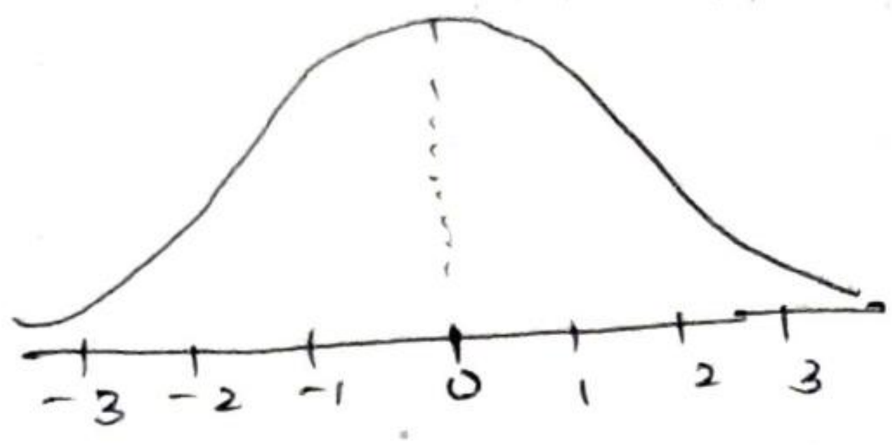
Standard normal distribution :-

* standard normal distribution is a special type of normal distribution where the mean = 0 and the standard deviation = 1

* with std norm dist we can able to find the area under the curve.



* advantage of std norm dist is any type of normal dist with any mean and std dev can be converted to std norm dist

* The process of converting normal dist to std normal dist is called standardization

* Formula

$$Z = \frac{x - \mu}{\sigma}$$

$Z \Rightarrow$ z-score

$x \Rightarrow$ observation

$\mu \Rightarrow$ Population mean

$\sigma \Rightarrow$ Population std. dev

Z-score :-

* Z-score is obtained by the formula of $\frac{x_i - \mu}{\sigma}$

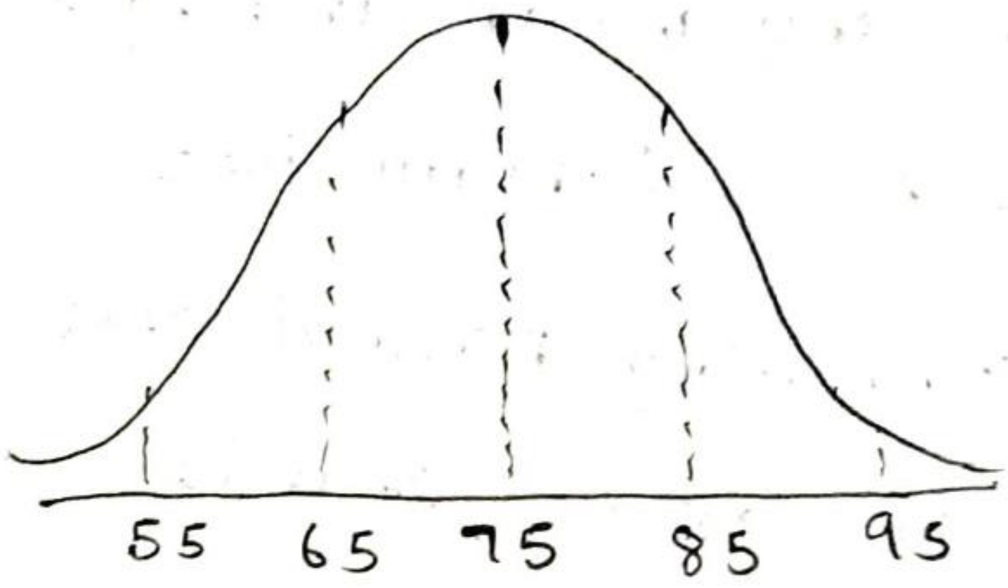
* with the help of Z-score we can find the area under curve from Z score table or standard normal dist table.

* For example if i want to find probability of students who got marks above 60 in maths.

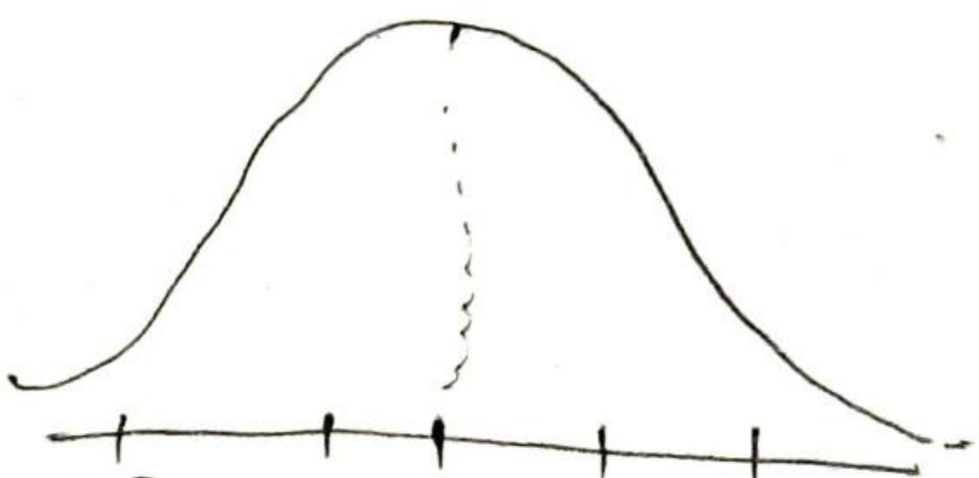
consider $\mu = 75$

$\sigma = 10$

Normal or gaussian dist



~~Calc~~ by using Z-score i transformed it to std. norm.



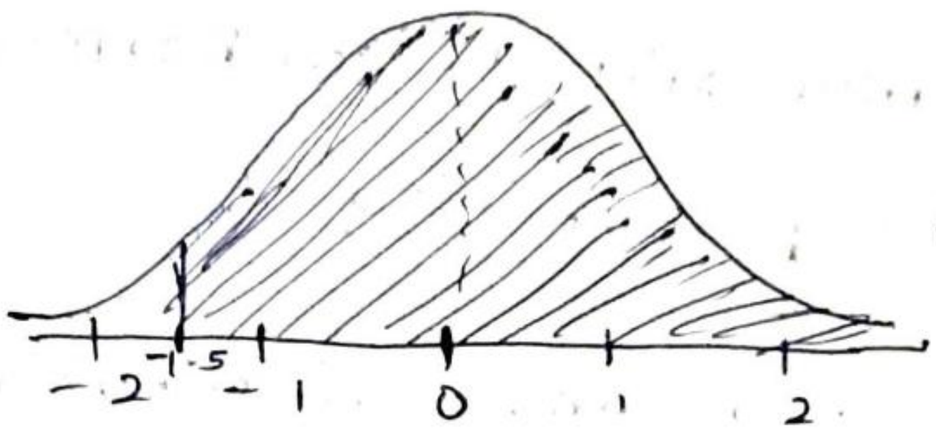
* In Std. norm. dist is symmetrical

* I want $P(X > 60)$

obtaining Z-score

$$Z = \frac{60 - 75}{10} = \frac{-15}{10}$$

$$\boxed{Z = -1.5}$$



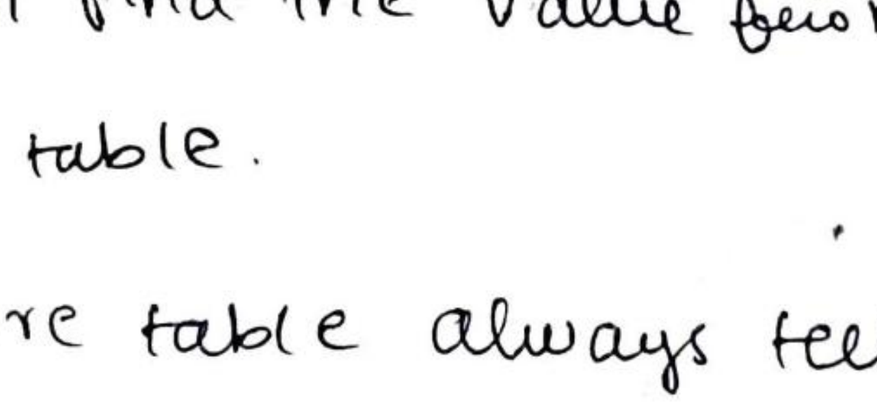
. I need to find the area of shaded region.

* I can find the value from Z score table or Std. dist. table.

* Z score table always tell the value left to it.

* My value for -1.5 in table is 0.668

* Φ.



0.0668

* This area is 0.0668

* Total distribution of std norm. dist is 1.0 or 100%

& $P(X < 60) = 0.0668$

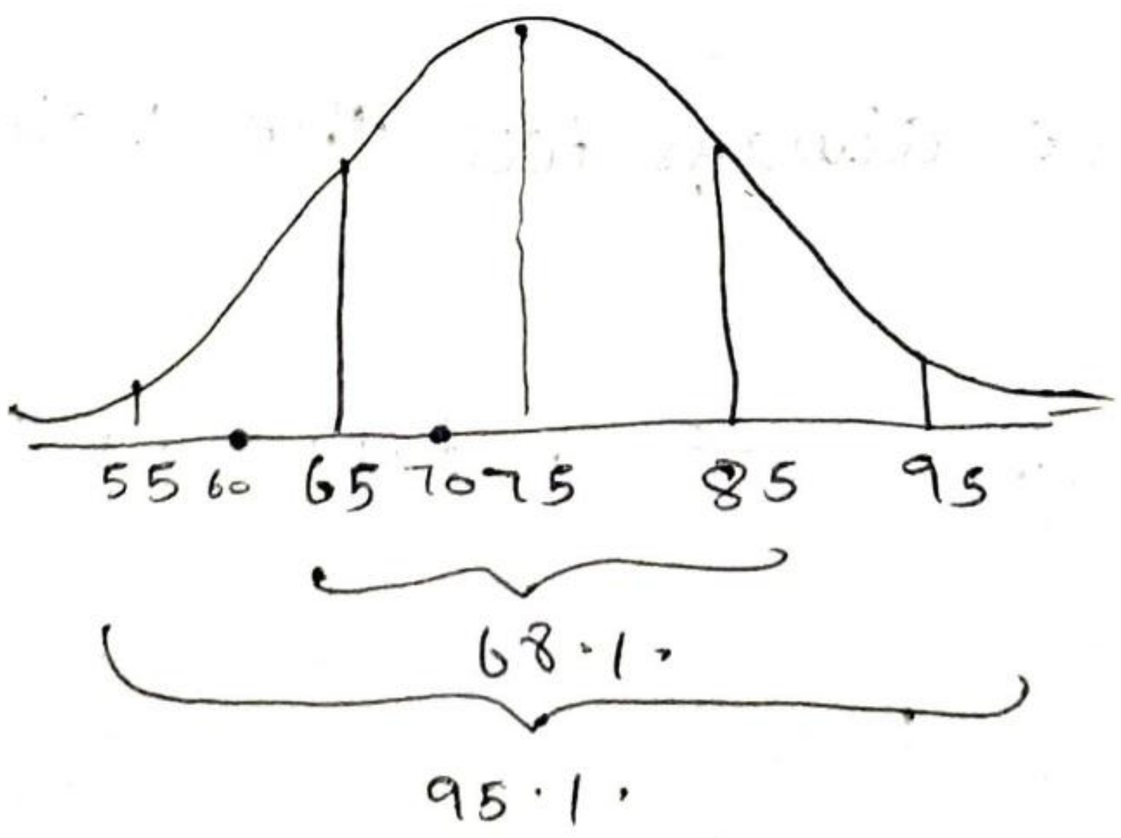
$P(X > 60) = 1 - 0.0668 = 0.9338$

$= 93.1\%$

∴ 93.1% of students scored more than 60 in maths.

* we will have a doubt ~~~~ that, why i want to change my normal dist to std norm. dist to find ~~this~~ the probability

★ It is because in normal distribution there is value of distribution only for 3 std. dev that is 68.1%, 95.1% and 99.7.1%.



★ But if i want to find ~~between 60~~ percentage of dist b/w 60 and 70, there is no emprical formula for that range in normal dist, so we are converting to std. norm. dist.