⊥ or ⌙ perpendicular

I. Normal Distribution

i. Continuous random variable

A continuous random variable is representing the measurement on a continuous scale. Those variables will change randomly with other factors.

eg games' result or outcomes ← poker hands, dice sum, roulettes, ...

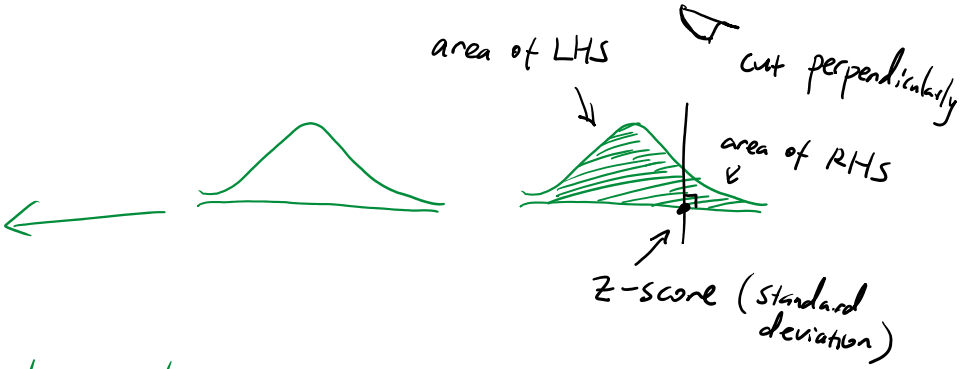
eg growths

eg weather

eg grades

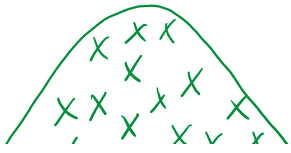
⋮

many other processed variables

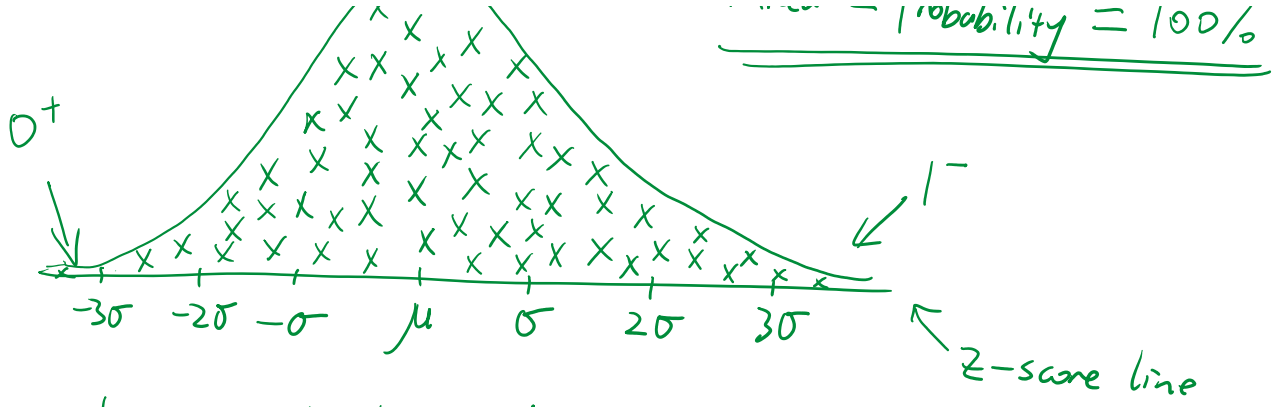


ii. Normal Distribution

A normal distribution is when the continuous random variables form a bell-shape curve, which is the probability density function. The other name is called "bell-curve".



Area = Probability = 100%



- Symmetric between the left and the right of μ.
- it converts the probability from the z-score (standard deviation) and vice versa.
- it is for next class' non-standard normal distribution to find probability. (Use the table.)

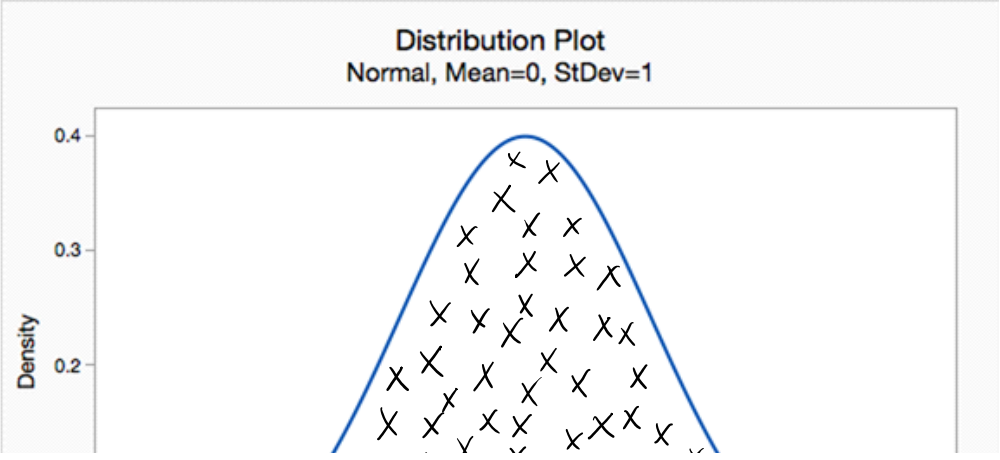
Note: Why is it important?

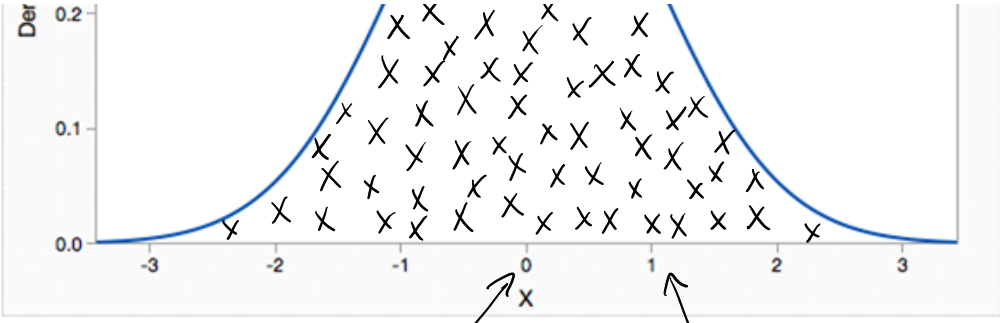
It gives the probability and its related application.

* symmetric
* prob. = 1
* z-score line (μ is mean)

iii. Standard Normal Distribution ← $\mu = 0$, $\sigma = 1$

← for using the table ← "old days"





μ σ

- this bell-curve is unique ($\mu = 0$, $\sigma = 1$)
- it is <u>not</u> important anymore.

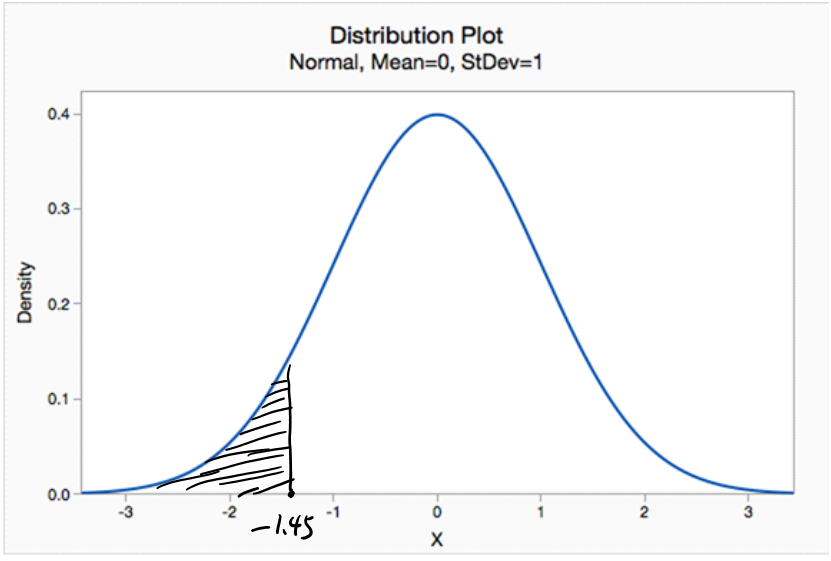
Notation

$$P(Z < *) \quad (\leq)$$

It means to find the probability to the $<$, under the bell-curve

eg Find $P(Z < -1.45)$

s:

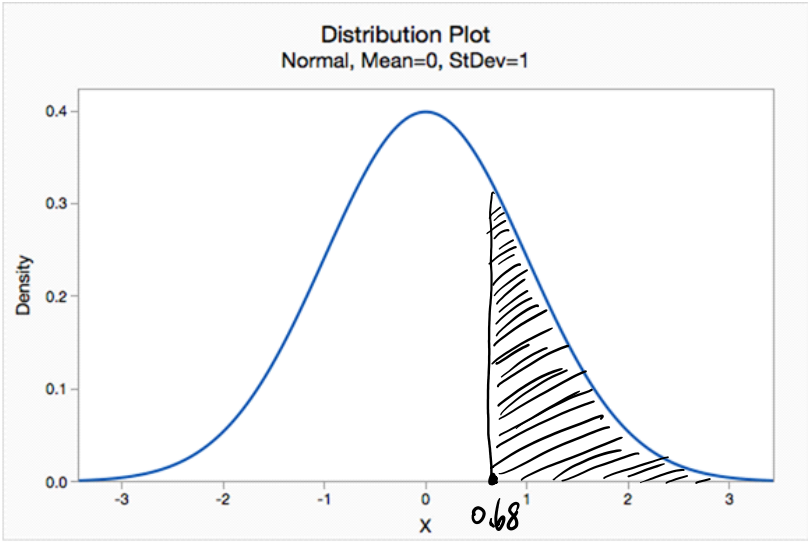


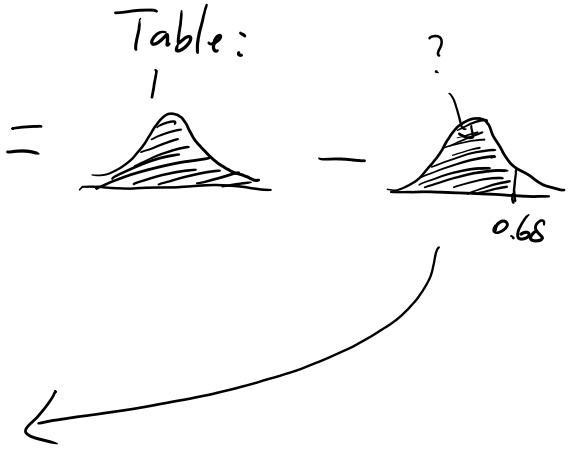
$P(Z < -1.45) =$ Table

$= \boxed{0.0735}$

eg Find $P(z > 0.68)$.

S:





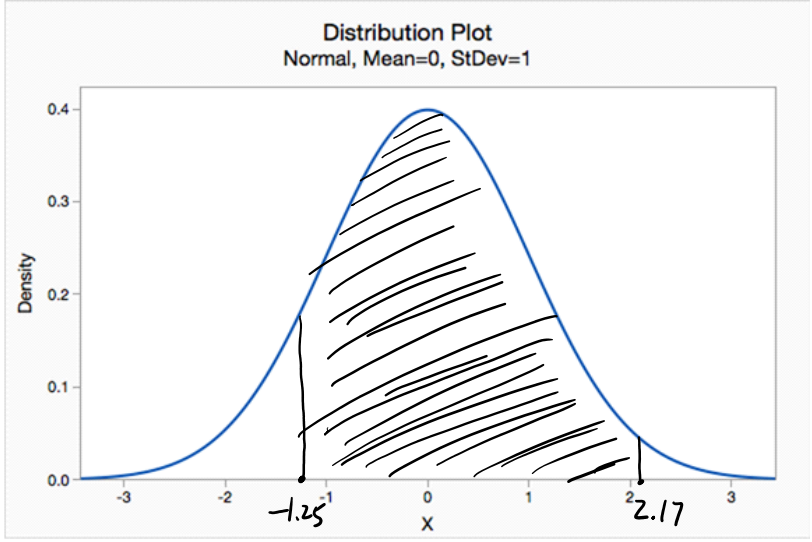
$$P(z > 0.68) = 1 - P(z < 0.68)$$

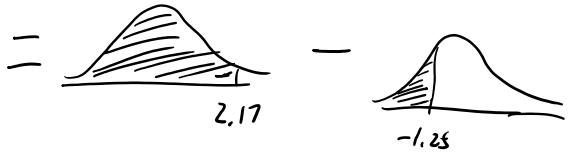
$$= 1 - 0.7517$$

$$= \boxed{0.2483}$$

eg Find $P(-1.25 < z < 2.17)$.

S:





$= P(Z < 2.17) - P(Z < -1.25)$

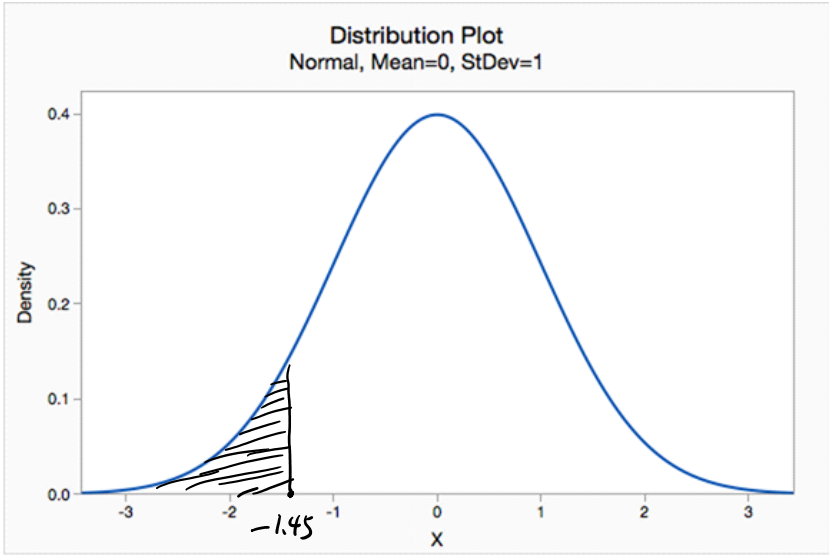
$= 0.9850 - 0.1056$

$= \boxed{0.8794}$

TI-84: 2nd → dist → 2 : normcdf(

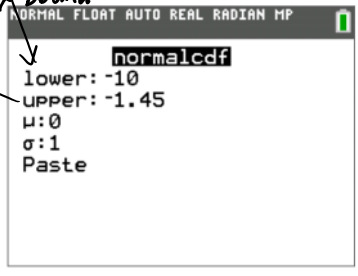
eg Find $P(Z < -1.45)$

S:

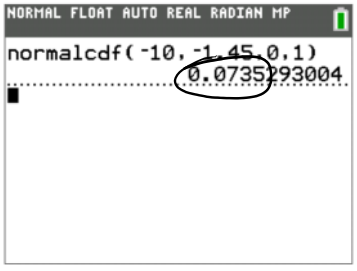


lower bound

upper bound

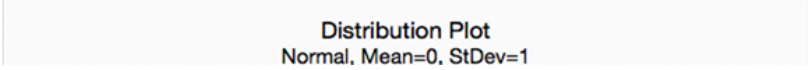


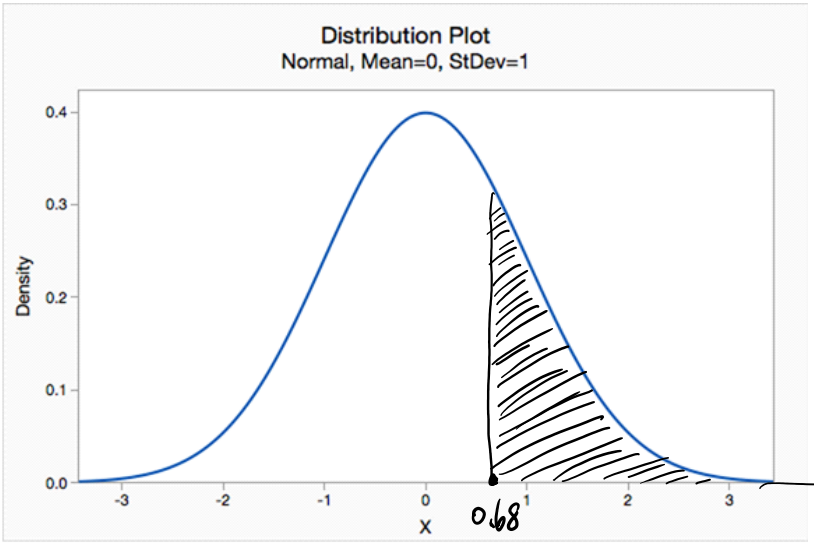
→

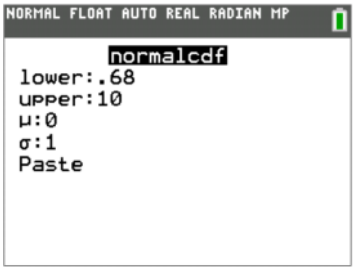


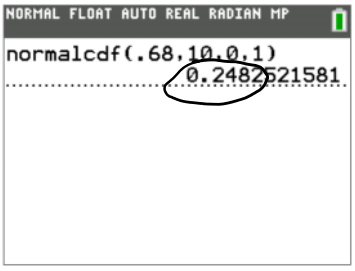
eg Find $P(Z > 0.68)$.

S:




Distribution Plot
Normal, Mean=0, StDev=1
Density
0.4
0.3
0.2
0.1
0.0
-3
-2
-1
0
1
2
3
X
.68
10


NORMAL FLOAT AUTO REAL RADIAN MP
normalcdf
lower:.68
upper:10
μ:0
σ:1
Paste


NORMAL FLOAT AUTO REAL RADIAN MP
normalcdf(.68,10,0,1)
0.2482521581