NORMAL DISTRIBUTION

NORMAL DISTRIBUTION

THE NORMAL DISTRIBUTION HOLDS A SPECIAL ROLE IN STATISTICS

IT TURNS OUT THAT MANY, MANY PHENOMENA IN REAL LIFE FOLLOW THE NORMAL CURVE

NORMAL DISTRIBUTION

WEIGHTS OF A TEAM
OF FOOTBALL PLAYERS

NORMAL DISTRIBUTION

HEIGHTS OF A GROUP OF FOOTBALL PLAYERS

THE SIZES OF HOUSES IN A NEIGHBORHOOD

NORMAL DISTRIBUTION

HEIGHTS OF A GROUP
OF FOOTBALL PLAYERS

THE SIZES OF HOUSES
IN A NEIGHBORHOOD

THE NUMBER OF DEFECTS IN
A LOT AT A FACTORY

NORMAL DISTRIBUTION

HEIGHTS OF A GROUP OF FOOTBALL PLAYERS

THE SIZES OF HOUSES IN A NEIGHBORHOOD

THE NUMBER OF DEFECTS IN A LOT AT A FACTORY

THE IQs OF A GROUP OF STUDENTS

NORMAL DISTRIBUTION

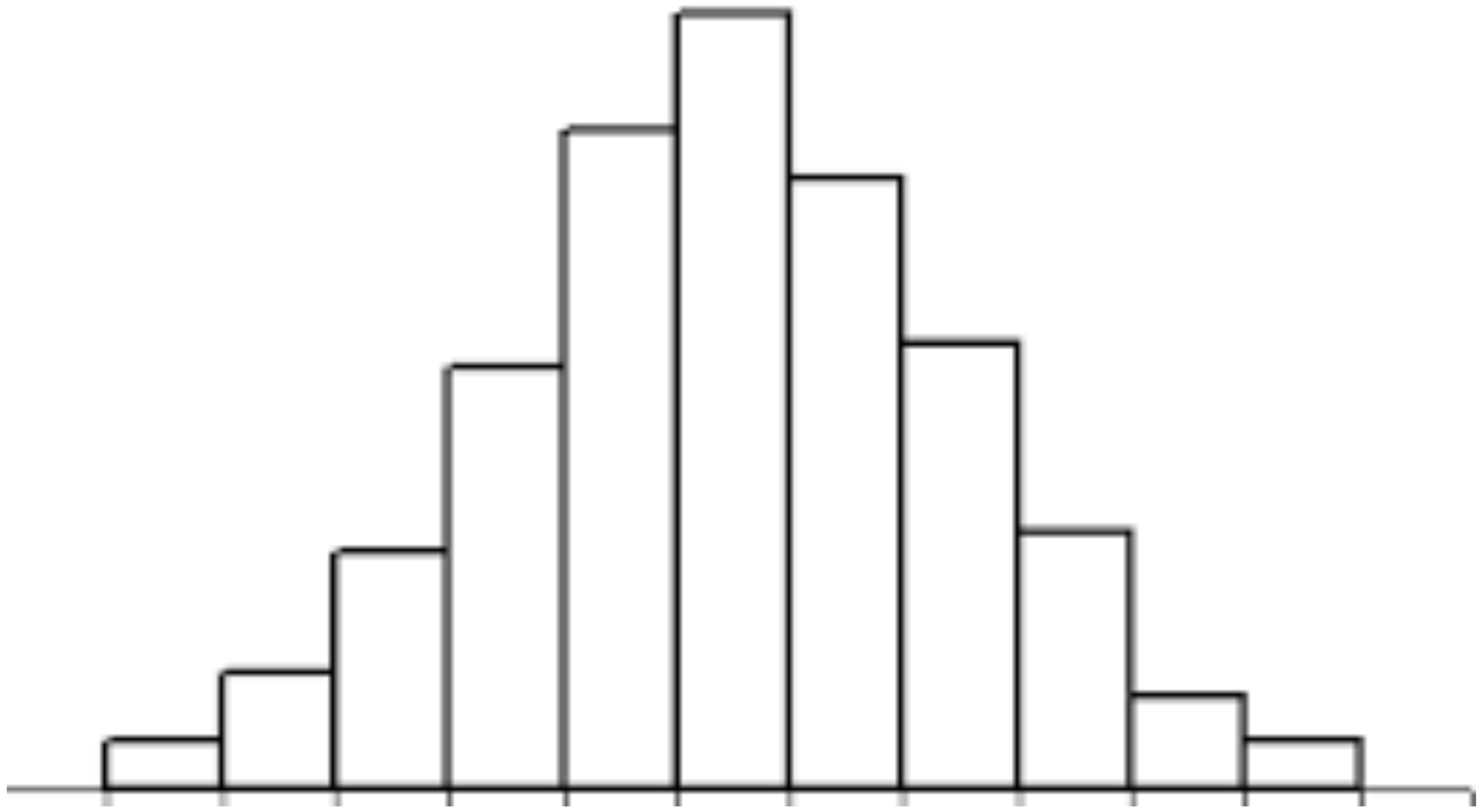
HEIGHTS OF A GROUP OF FOOTBALL PLAYERS

THE SIZES OF HOUSES IN A NEIGHBORHOOD

THE NUMBER OF DEFECTS IN A LOT AT A FACTORY

THE IQs OF A GROUP OF STUDENTS

IF YOU TAKE ANY OF THESE AND PLOT A HISTOGRAM OF THE VALUES



NORMAL DISTRIBUTION

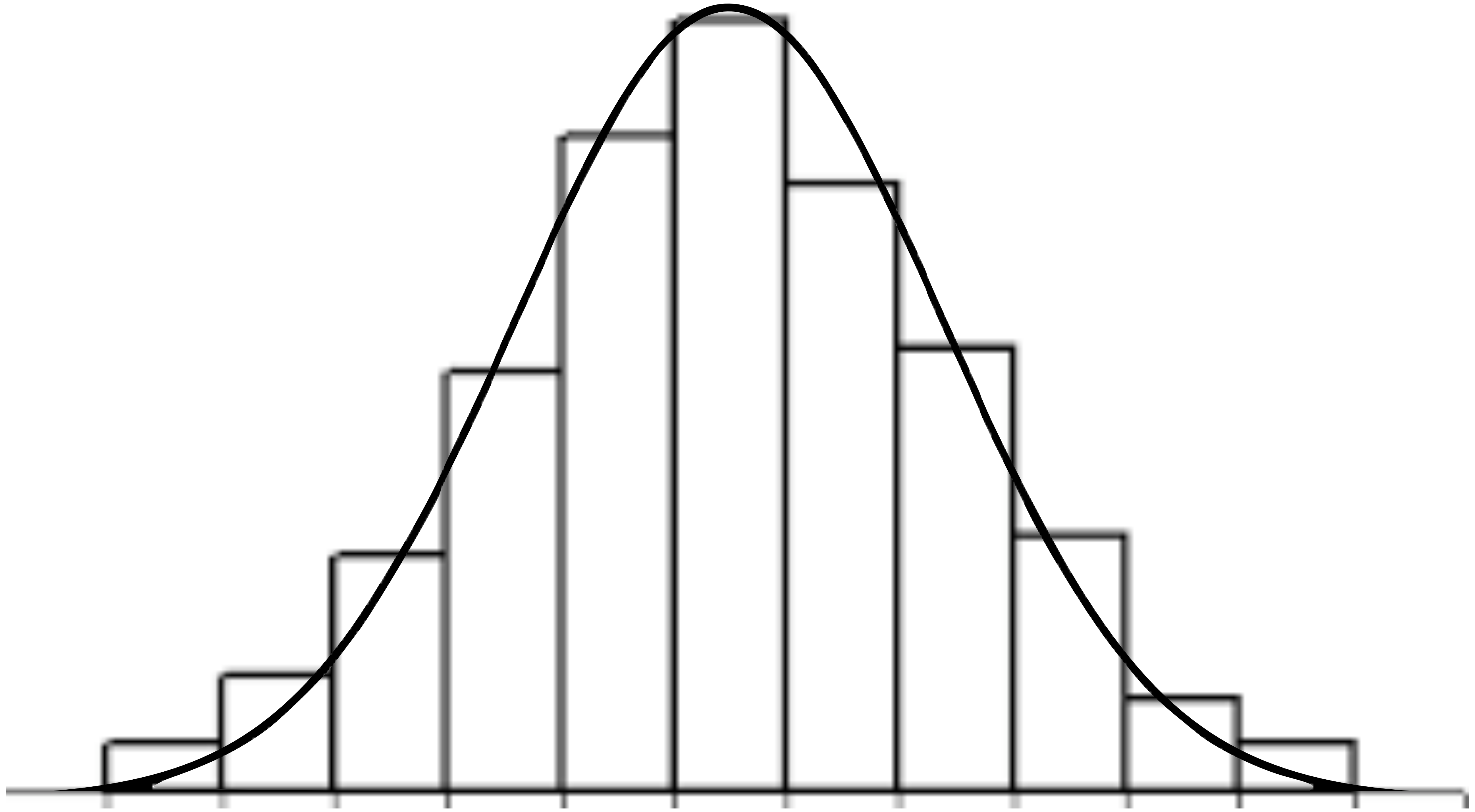
HEIGHTS OF A GROUP OF FOOTBALL PLAYERS

THE SIZES OF HOUSES IN A NEIGHBORHOOD

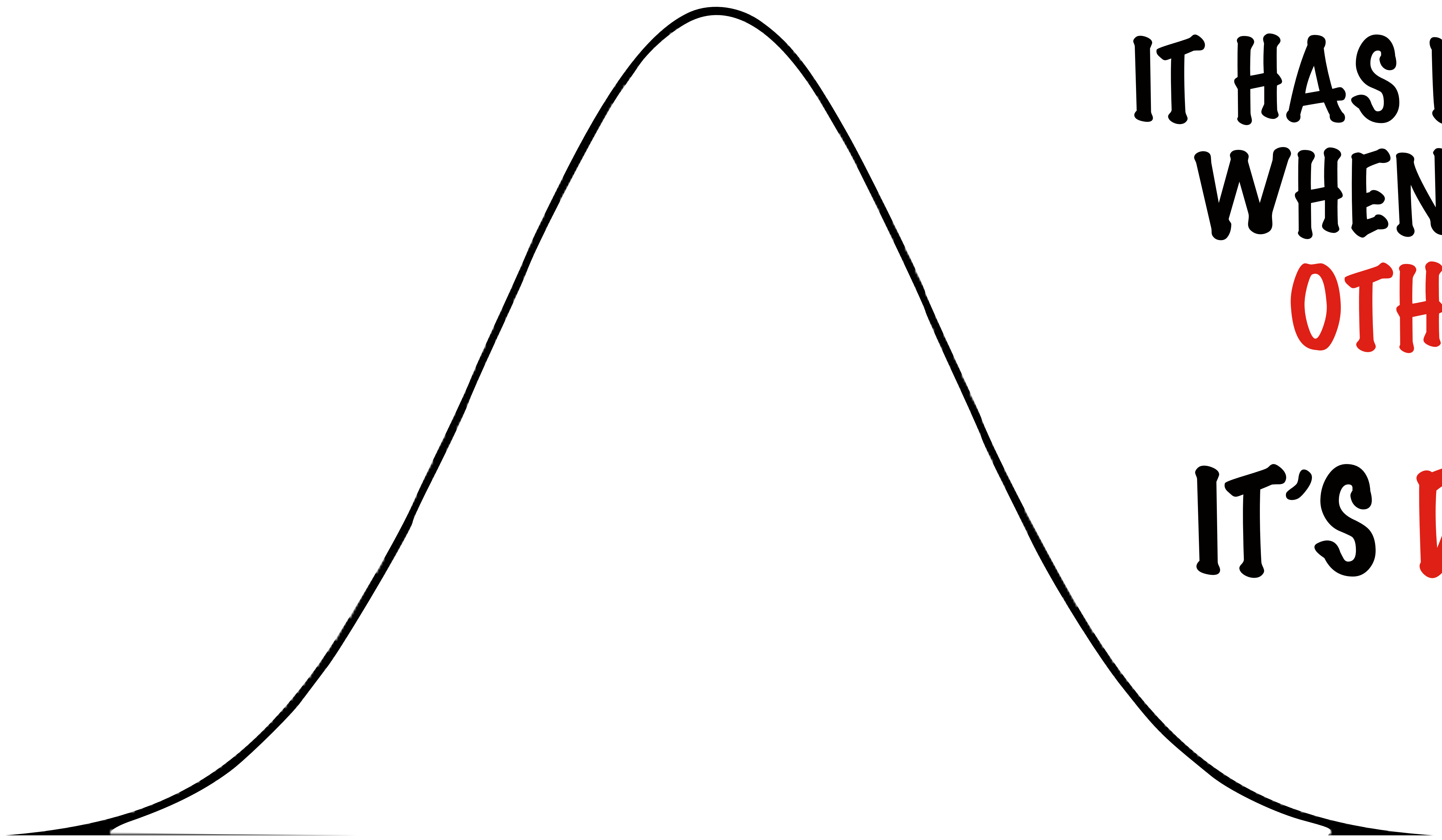
THE NUMBER OF DEFECTS IN A LOT AT A FACTORY

THE IQs OF A GROUP OF STUDENTS

THE RESULT WILL BE VERY CLOSE THE NORMAL DISTRIBUTION CURVE



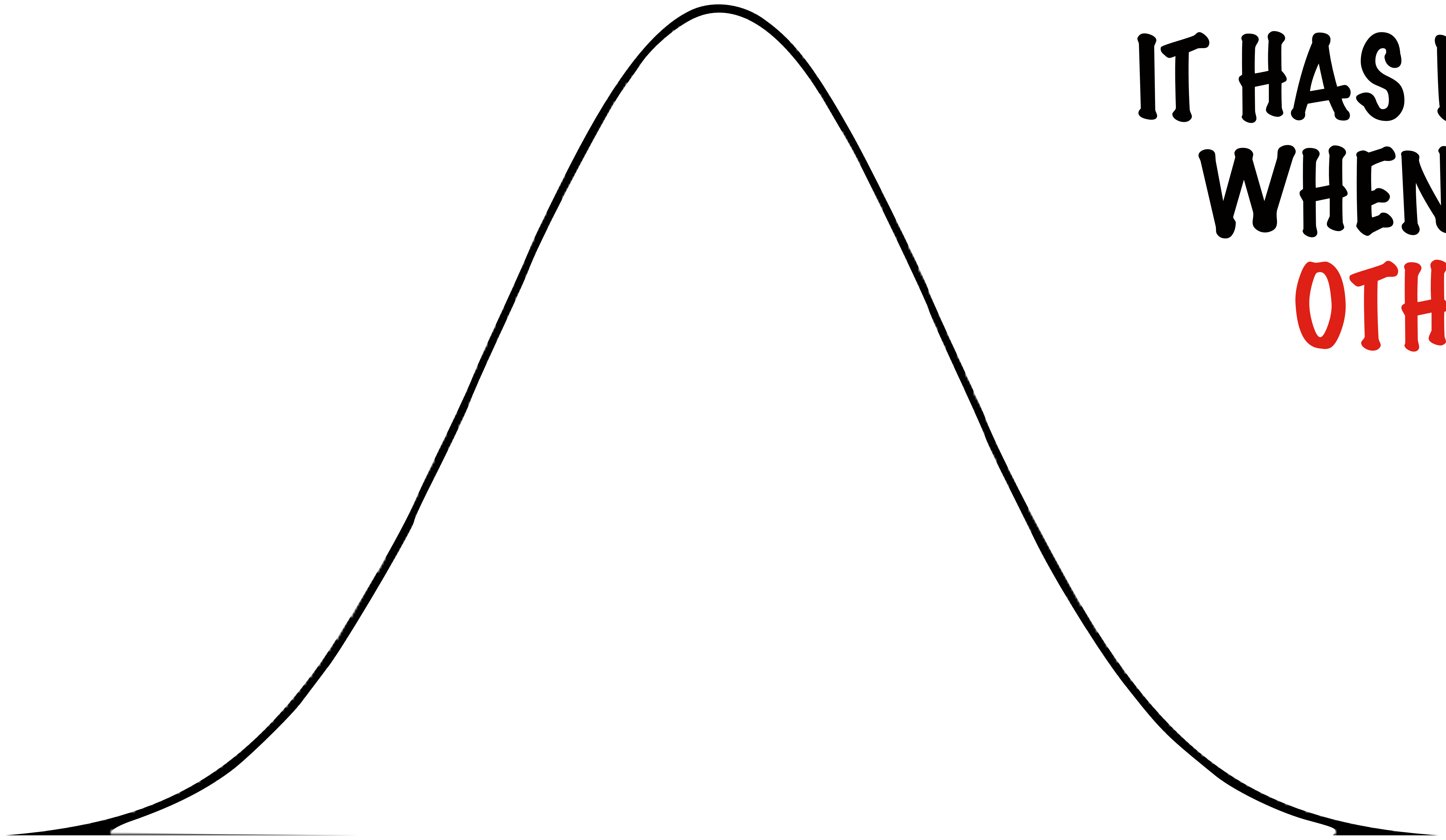
NORMAL DISTRIBUTION



IT HAS BEEN MATHEMATICALLY PROVED THAT WHEN ANYTHING IS THE RESULT OF MANY OTHER INDEPENDENT RANDOM THINGS

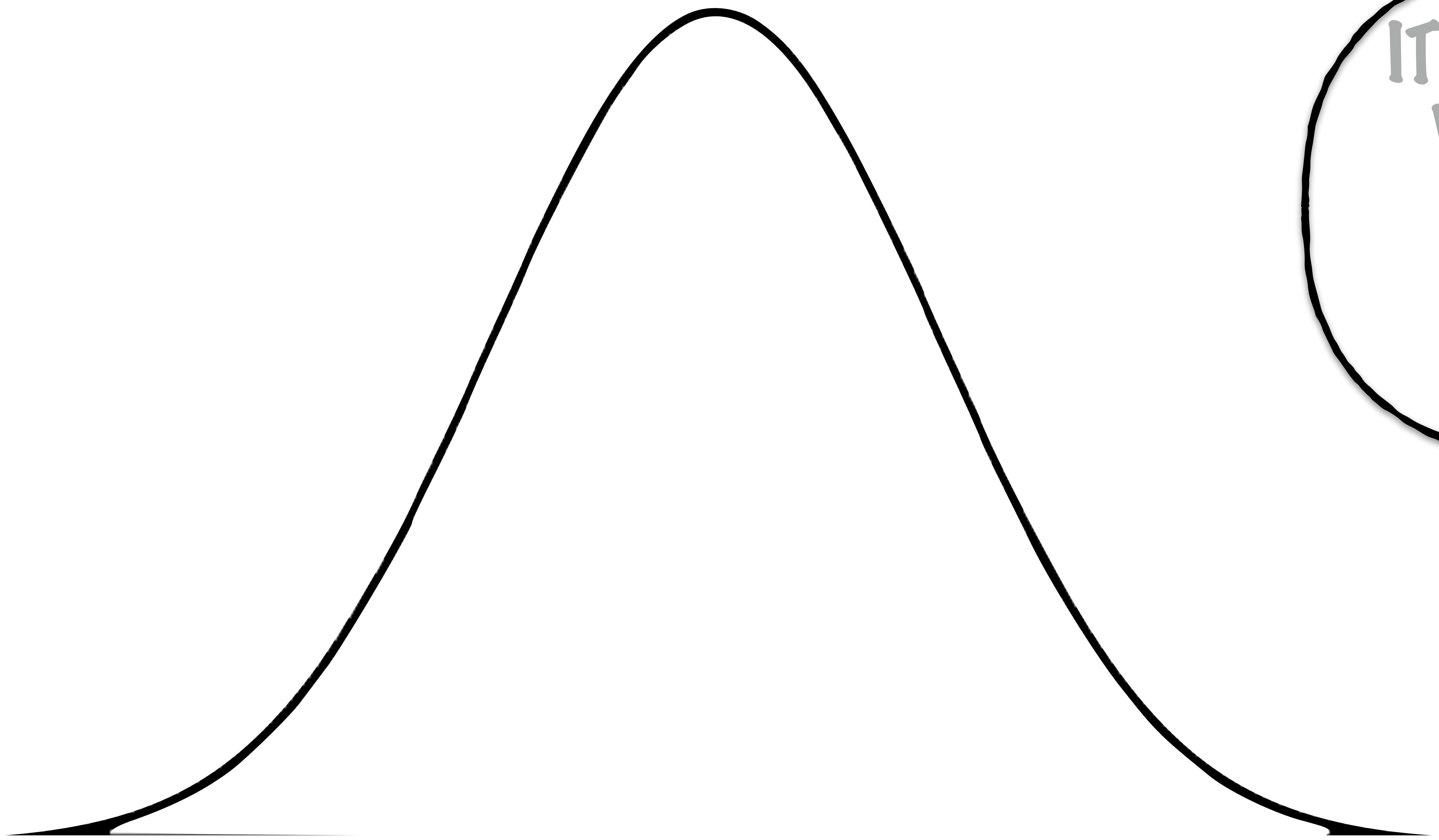
IT'S DISTRIBUTION WILL FOLLOW THE NORMAL CURVE

NORMAL DISTRIBUTION



IT HAS BEEN MATHEMATICALLY PROVED THAT WHEN ANYTHING IS THE RESULT OF MANY OTHER INDEPENDENT RANDOM THINGS

NORMAL DISTRIBUTION

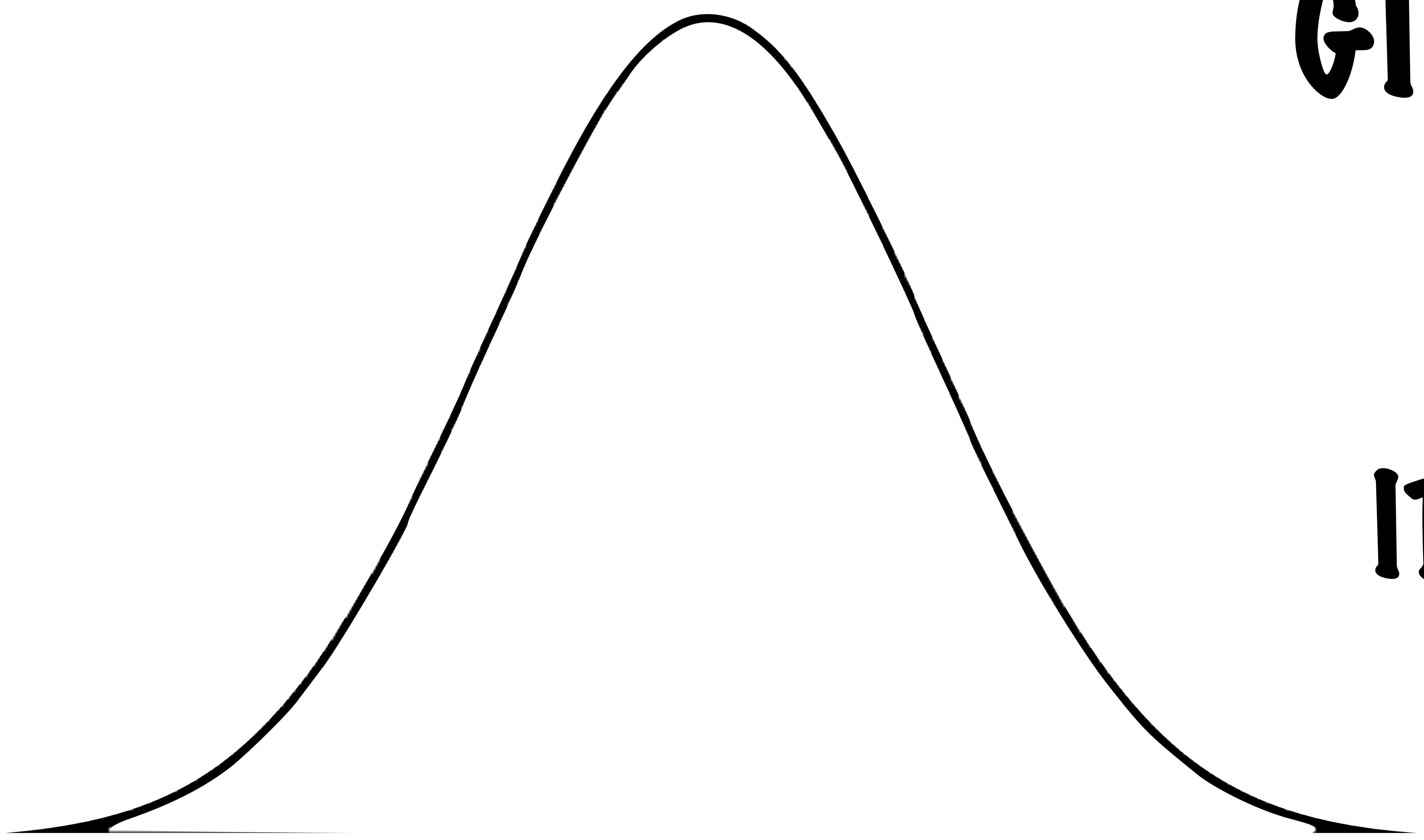


IT HAS BEEN MATHEMATICALLY PROVED THAT WHEN ANYTHING IS THE RESULT OF MANY OTHER INDEPENDENT RANDOM THINGS

IT'S DISTRIBUTION WILL FOLLOW THE NORMAL CURVE

THE CENTRAL LIMIT THEOREM

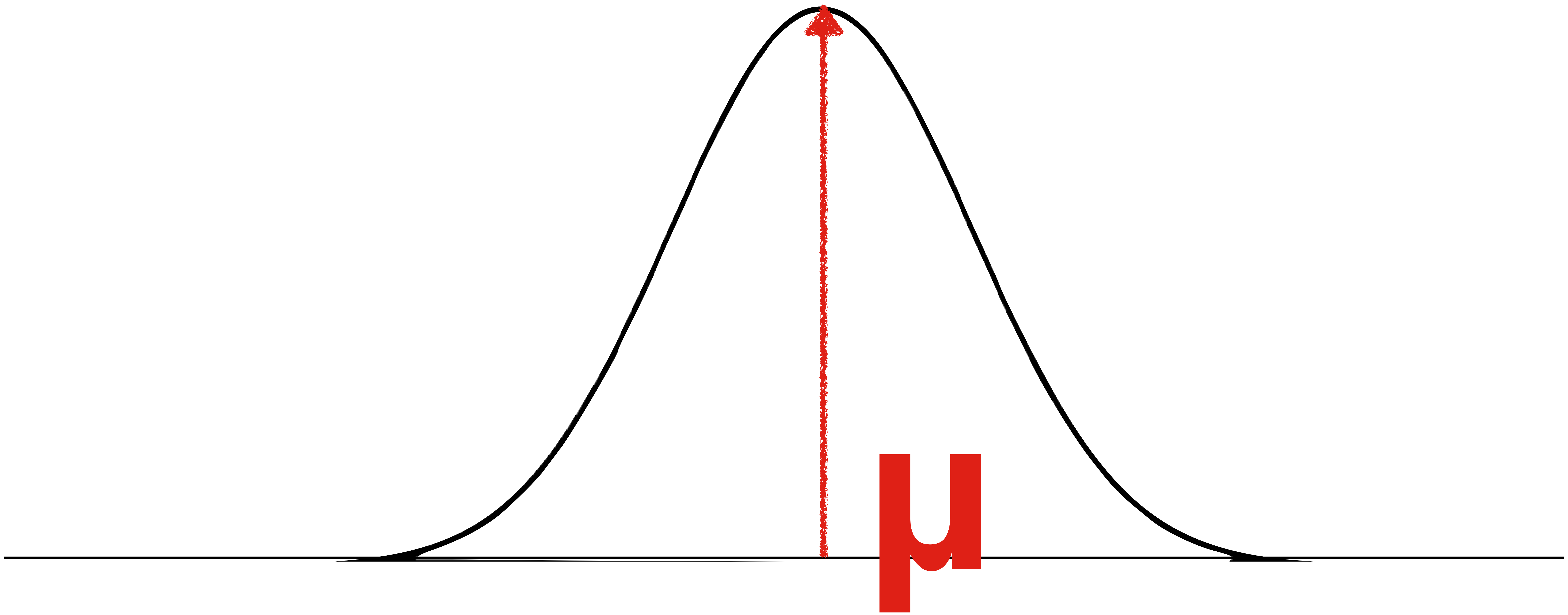
NORMAL DISTRIBUTION



GIVEN HOW OFTEN WE'LL COME ACROSS IT

IT'S WORTH SPENDING SOME TIME UNDERSTANDING IT'S CHARACTERISTICS

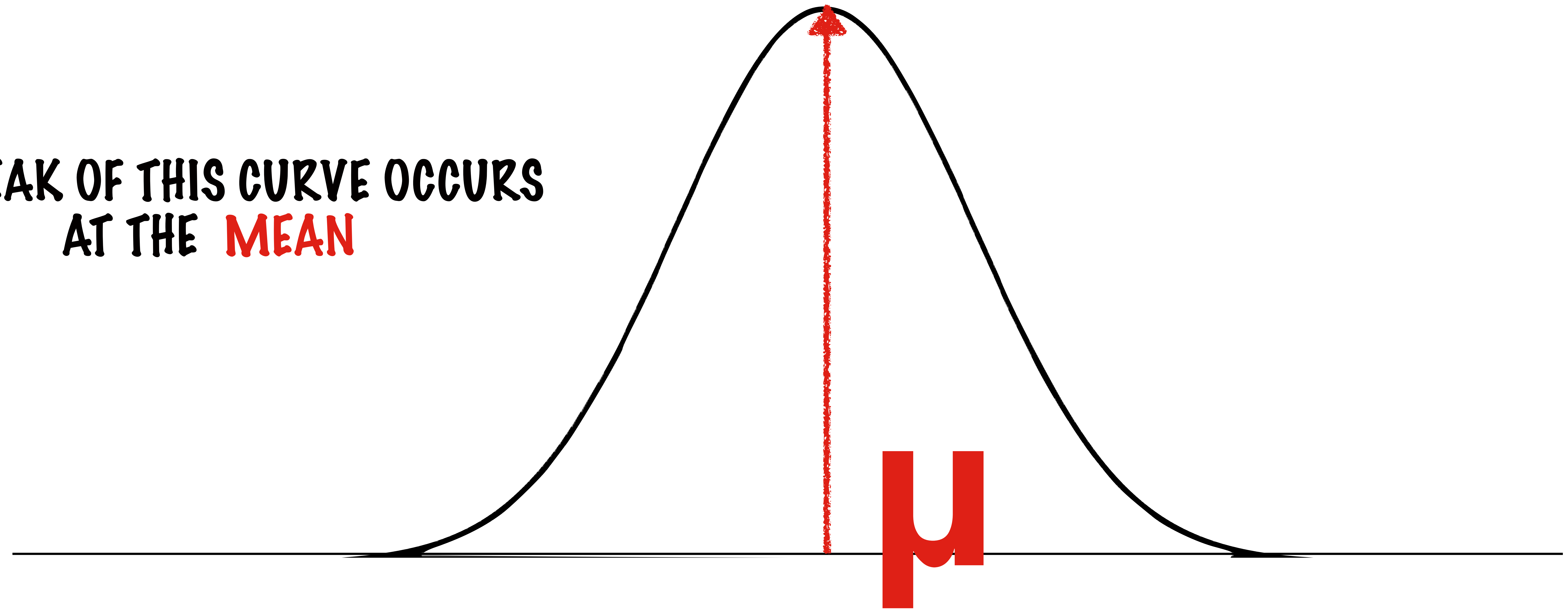
NORMAL DISTRIBUTION



THE PEAK OF THIS CURVE OCCURS AT THE MEAN

NORMAL DISTRIBUTION

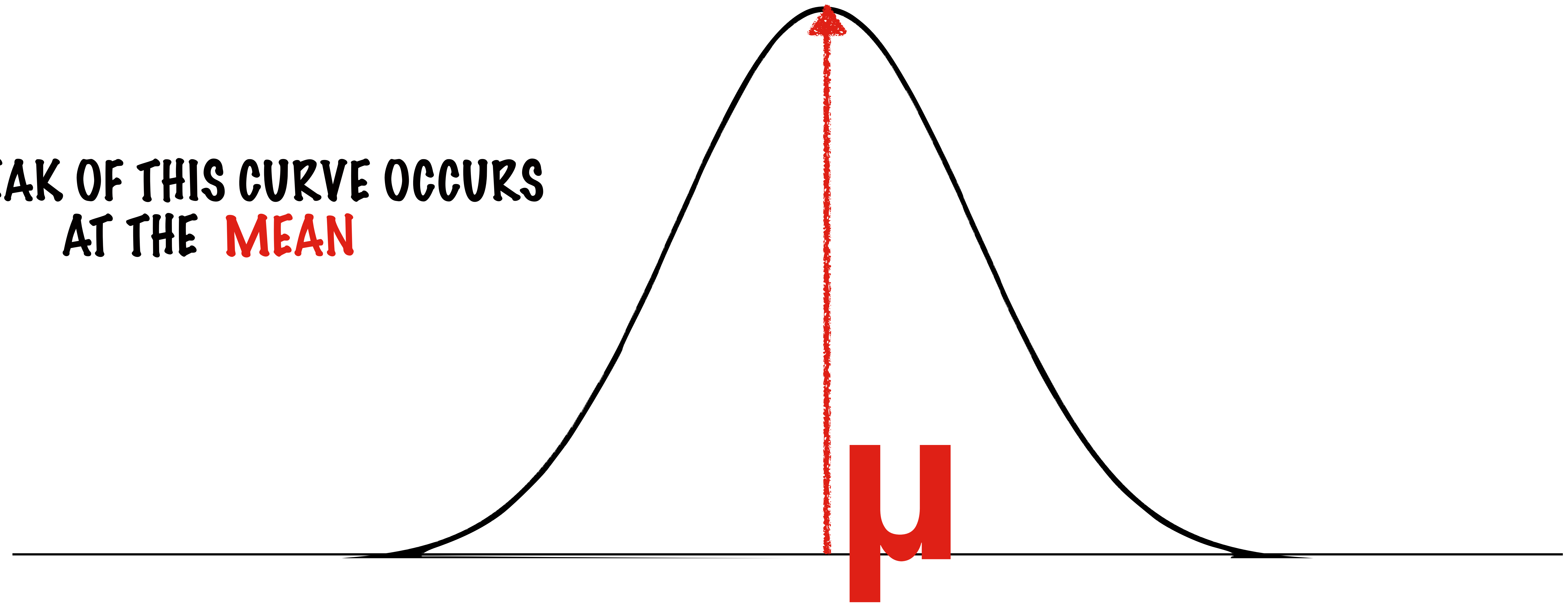
THE PEAK OF THIS CURVE OCCURS AT THE MEAN



WHEN A VARIABLE IS NORMAL, IT'S VALUE WILL "MOST LIKELY" BE CLOSE TO THE MEAN

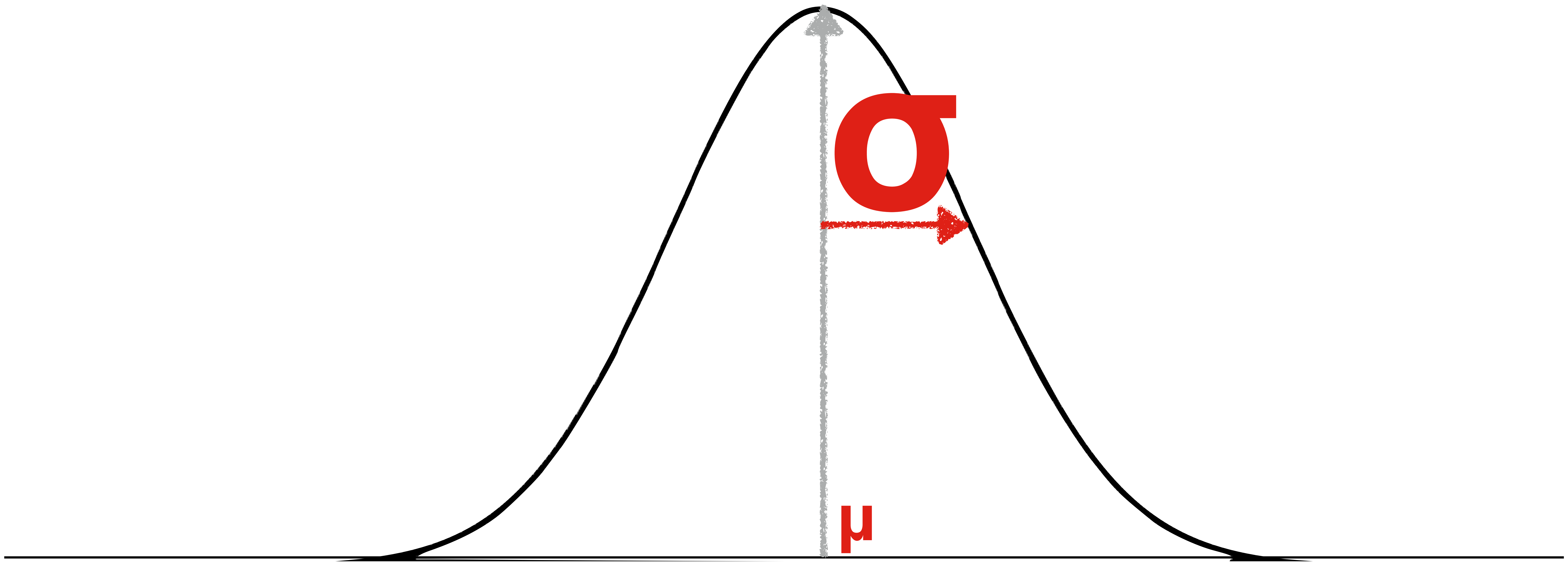
NORMAL DISTRIBUTION

THE PEAK OF THIS CURVE OCCURS
AT THE **MEAN**



WHEN A VARIABLE IS NORMAL, IT'S VALUE WILL "MOST LIKELY" BE CLOSE TO THE MEAN

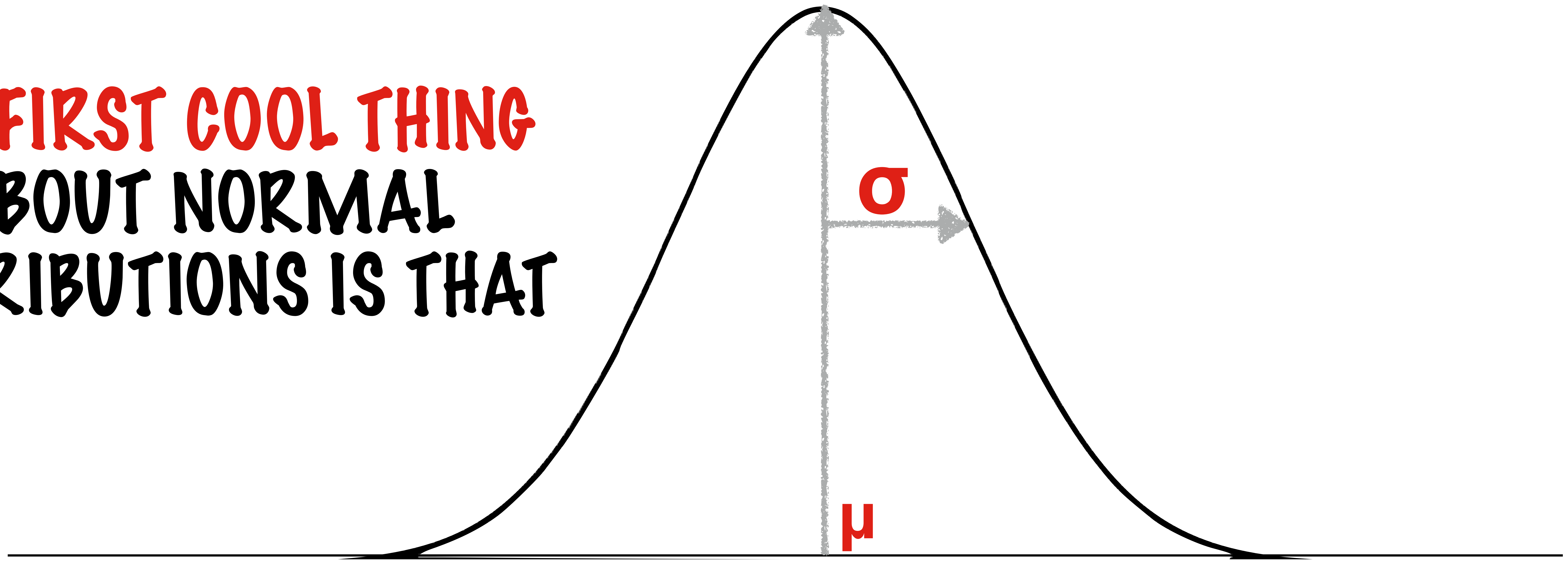
NORMAL DISTRIBUTION



THE SPREAD OF THIS CURVE IS GIVEN BY THE STANDARD DEVIATION

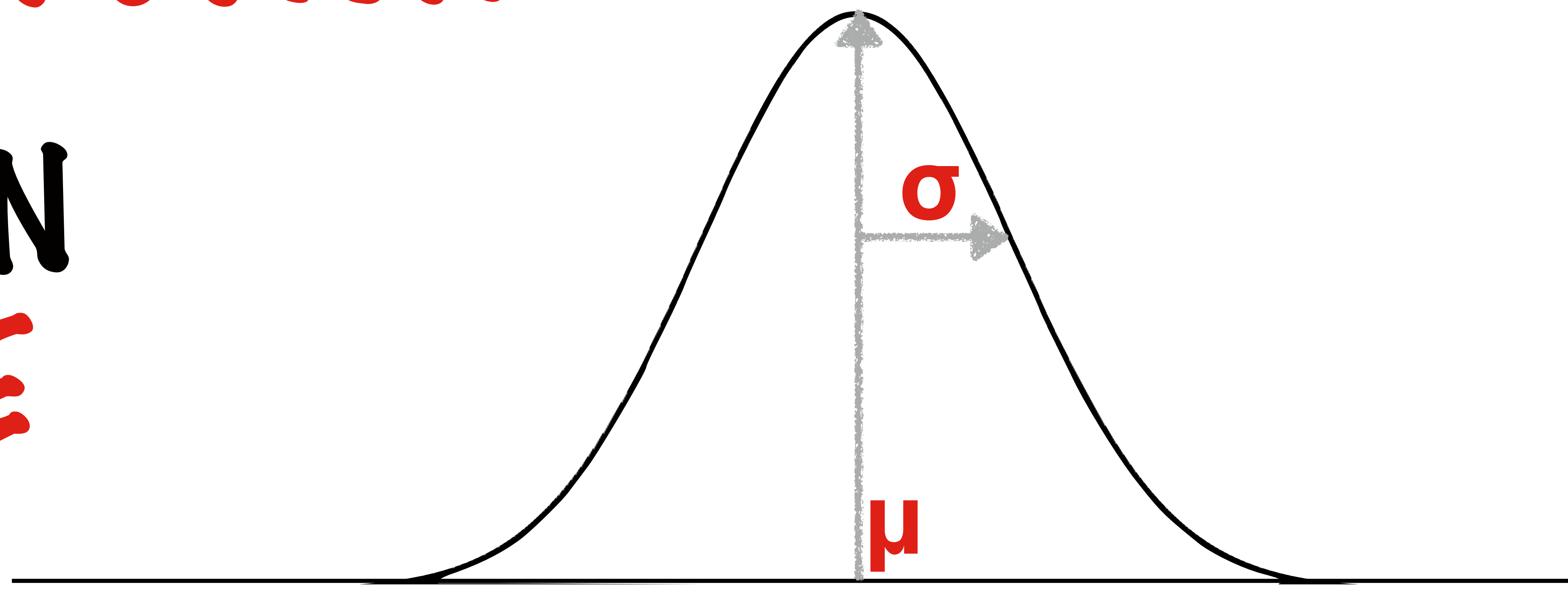
NORMAL DISTRIBUTION

THE FIRST COOL THING ABOUT NORMAL DISTRIBUTIONS IS THAT



IF YOU KNOW THE MEAN, SD YOU CAN TELL THE PROBABILITY OF ANY VALUE

NORMAL DISTRIBUTION

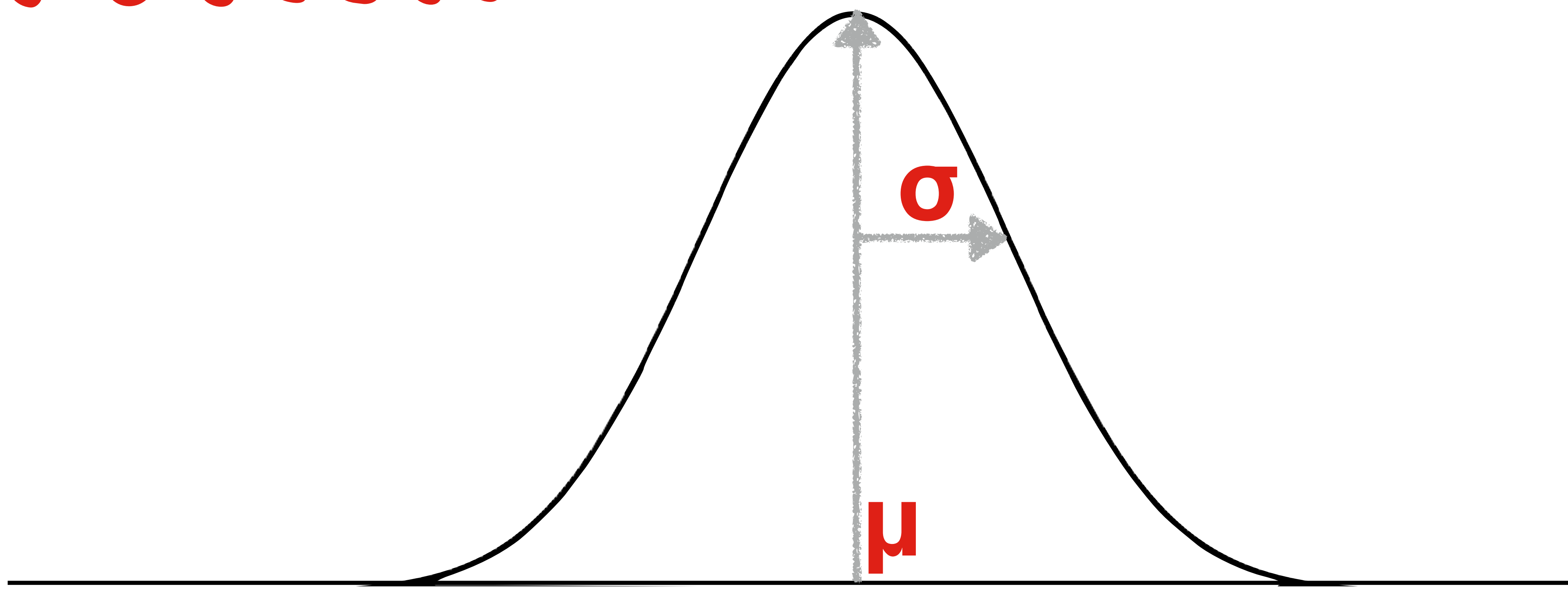


IF YOU KNOW THE MEAN, SD YOU CAN TELL THE PROBABILITY OF ANY VALUE

$$f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

NORMAL DISTRIBUTION

IF YOU KNOW THE MEAN, SD YOU CAN TELL THE PROBABILITY OF ANY VALUE

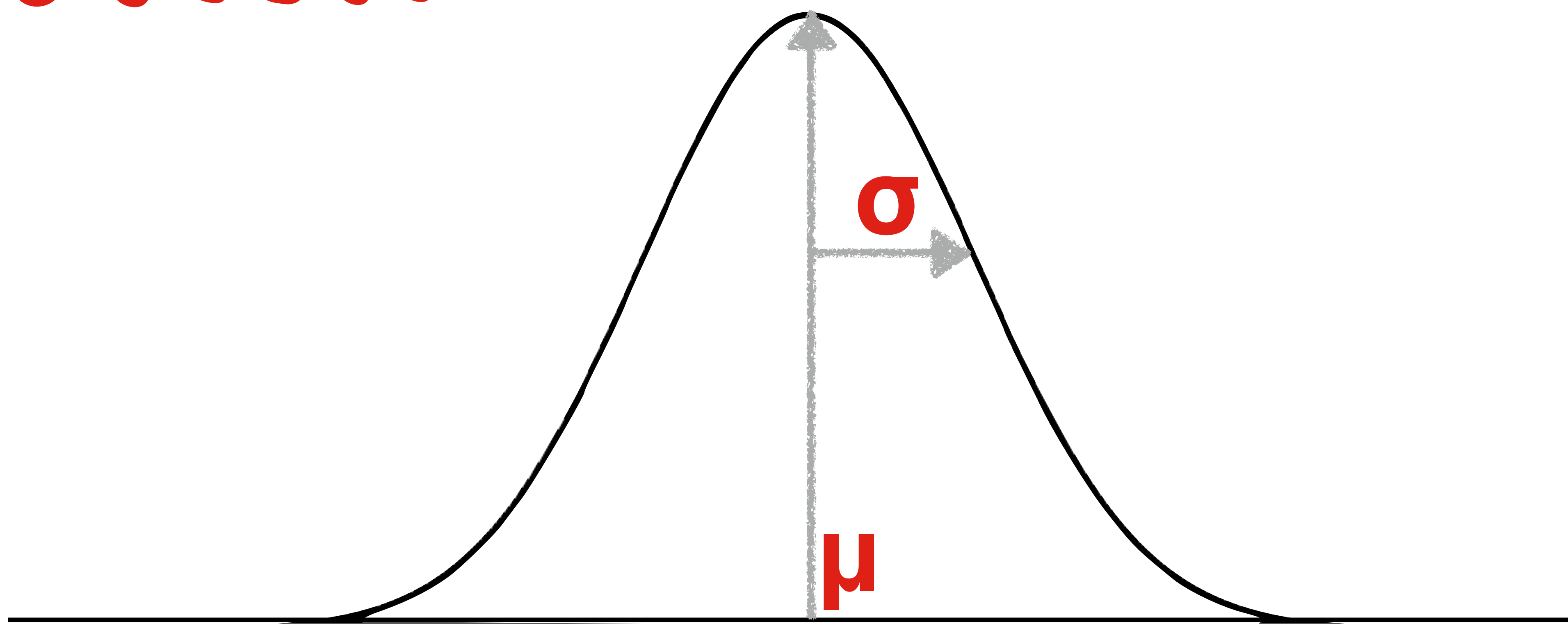


$$f(x) = F(x, \mu, \sigma)$$

IF YOU LOOK CLOSELY, YOU'LL SEE THAT THIS FUNCTION HAS 2 PARAMETERS

NORMAL DISTRIBUTION

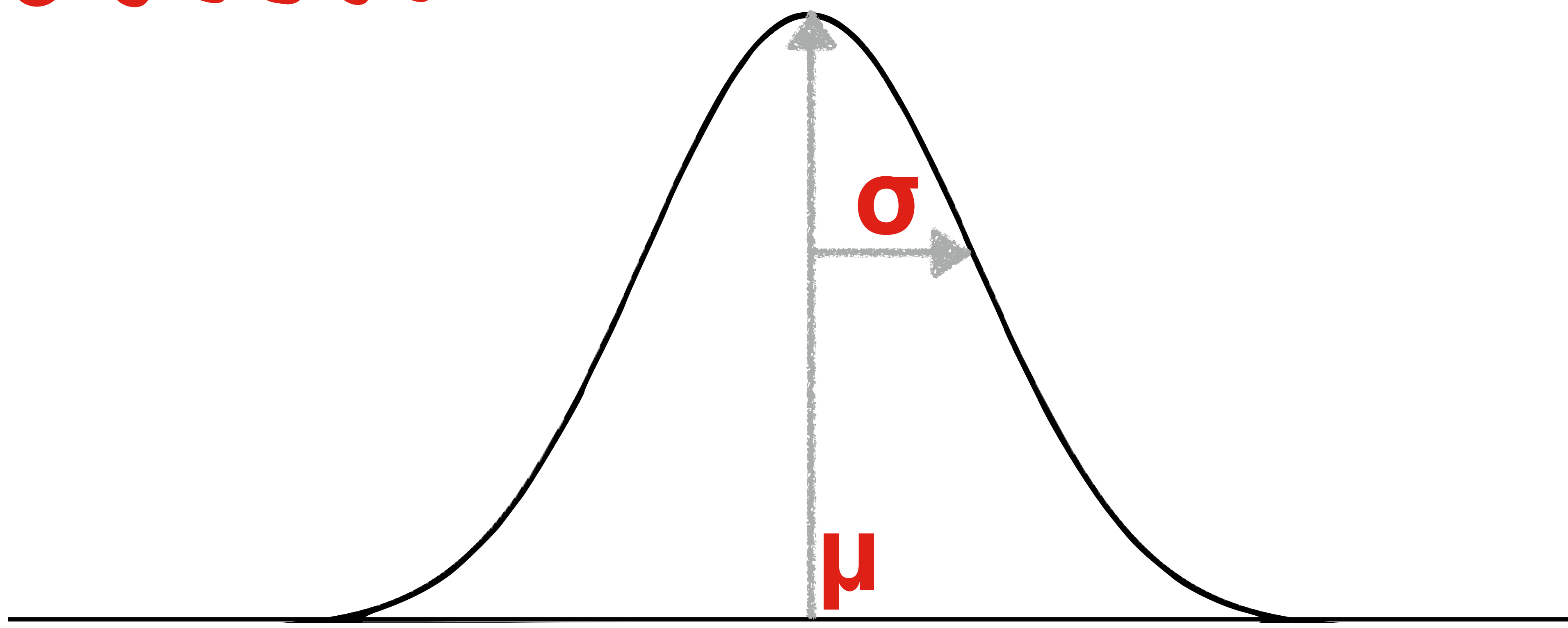
$$f(x) = F(x, \mu, \sigma)$$



IF YOU KNOW THE MEAN, SD YOU CAN TELL THE PROBABILITY OF ANY VALUE

NORMAL DISTRIBUTION

$$f(x) = F(x, \mu, \sigma)$$

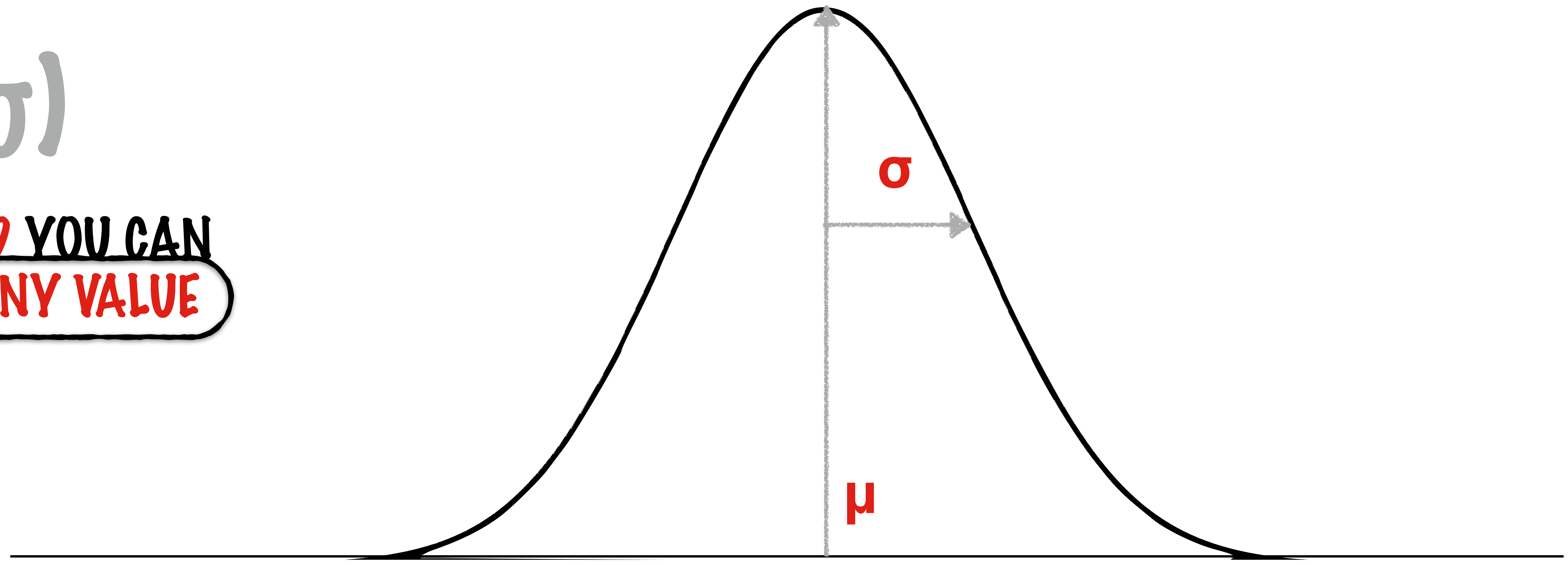


IF YOU KNOW THE MEAN, SD YOU CAN TELL THE PROBABILITY OF ANY VALUE

NORMAL DISTRIBUTION

$f(x) = F(x, \mu, \sigma)$

IF YOU KNOW THE MEAN, SD YOU CAN TELL THE PROBABILITY OF ANY VALUE



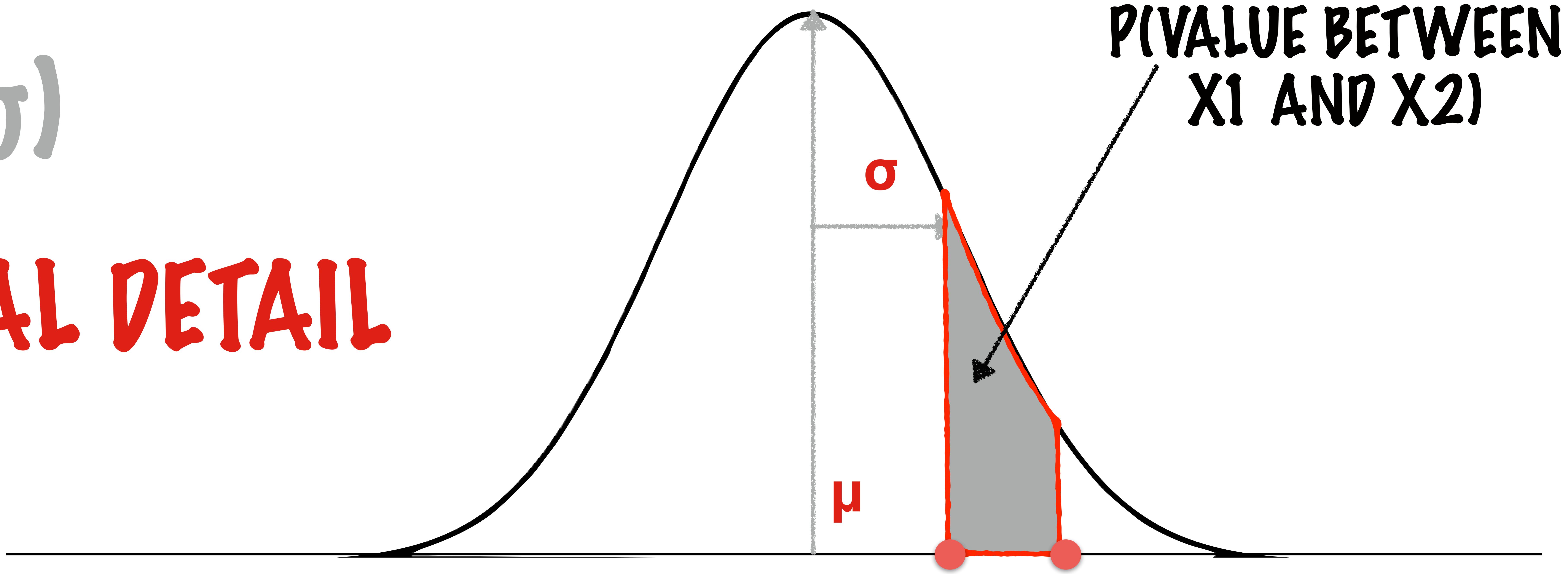
ONE TECHNICAL DETAIL

THIS CURVE DOESN'T REALLY REPRESENT THE PROBABILITY OF A VALUE

NORMAL DISTRIBUTION

$$f(x) = F(x, \mu, \sigma)$$

ONE TECHNICAL DETAIL

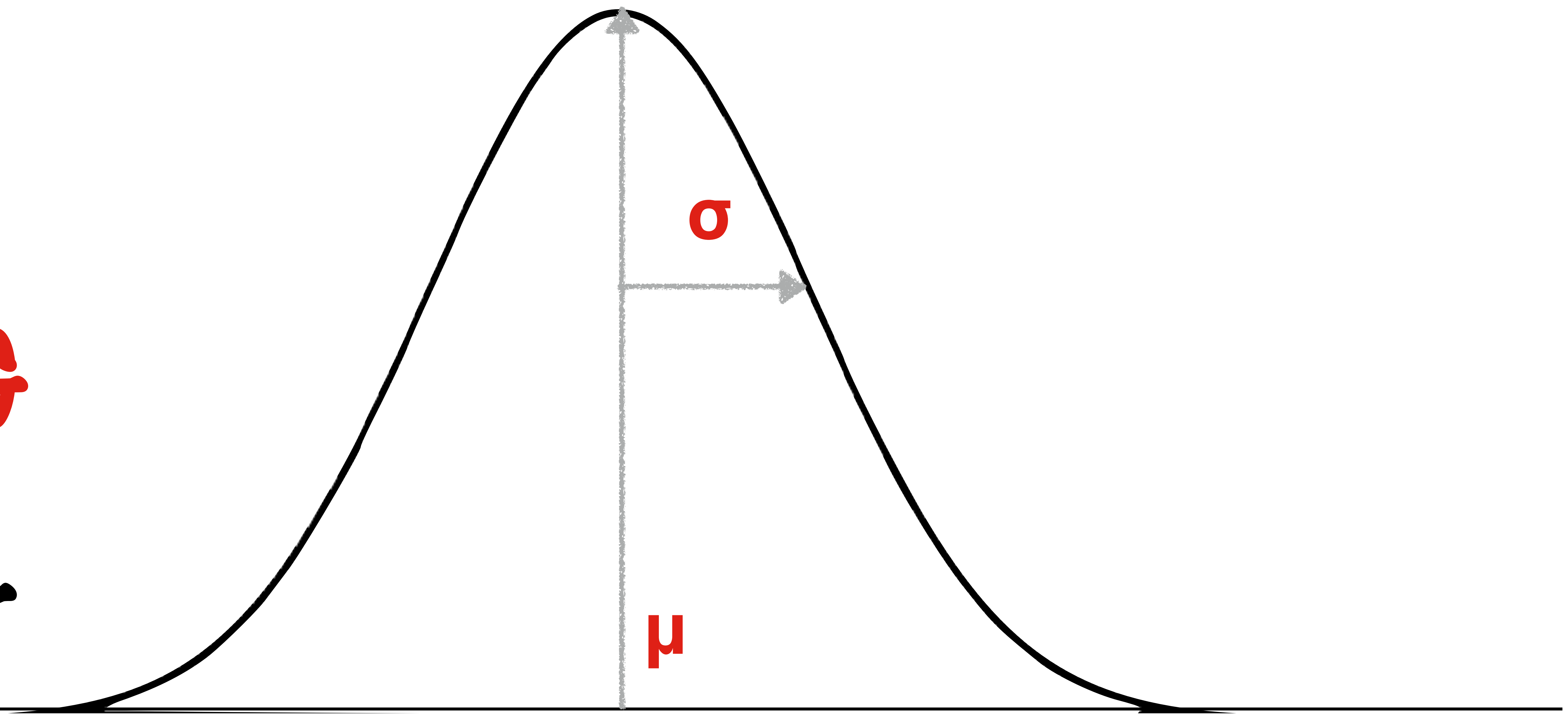


IF YOU TAKE ANY 2 POINTS X1 X2

THE AREA UNDER THE CURVE = P (THE VARIABLE IS BETWEEN THE 2 POINTS)

NORMAL DISTRIBUTION

$f(x) = F(x, \mu, \sigma)$



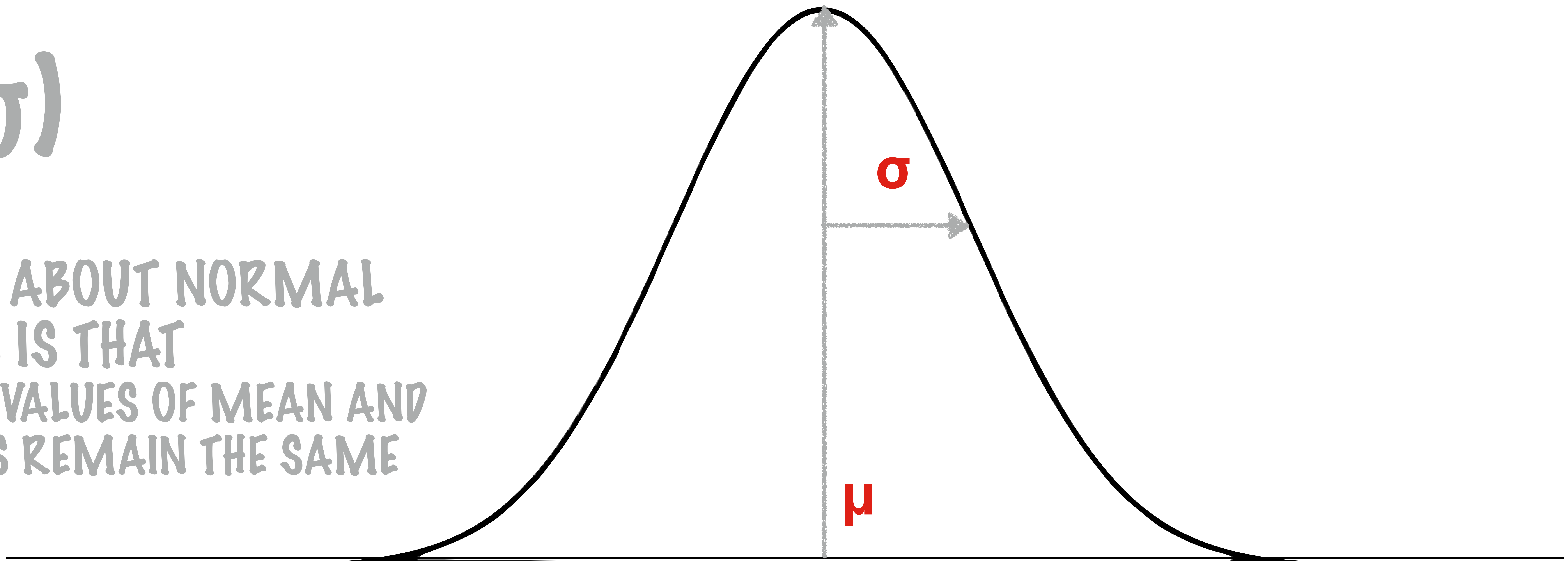
THE SECOND COOL THING ABOUT NORMAL DISTRIBUTIONS IS THAT

REGARDLESS OF THE ACTUAL VALUES OF MEAN AND SD SOME CHARACTERISTICS REMAIN THE SAME

NORMAL DISTRIBUTION

$$f(x) = F(x, \mu, \sigma)$$

THE SECOND COOL THING ABOUT NORMAL DISTRIBUTIONS IS THAT
REGARDLESS OF THE ACTUAL VALUES OF MEAN AND SD SOME CHARACTERISTICS REMAIN THE SAME

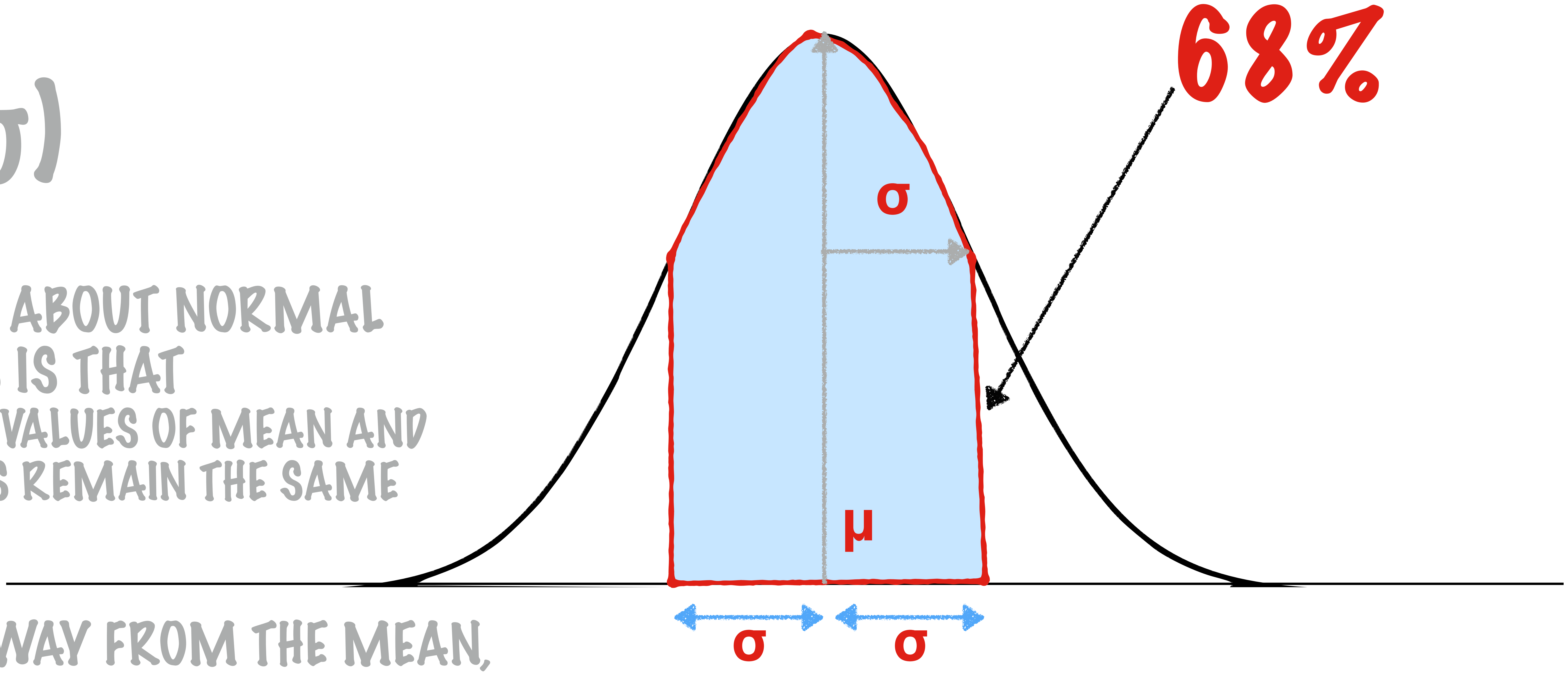


AS YOU MOVE FURTHER AWAY FROM THE MEAN,
THE PROBABILITY DECREASES EXPONENTIALLY

NORMAL DISTRIBUTION

$f(x) = F(x, \mu, \sigma)$

THE SECOND COOL THING ABOUT NORMAL DISTRIBUTIONS IS THAT
REGARDLESS OF THE ACTUAL VALUES OF MEAN AND SD SOME CHARACTERISTICS REMAIN THE SAME



AS YOU MOVE FURTHER AWAY FROM THE MEAN, THE PROBABILITY DECREASES EXPONENTIALLY

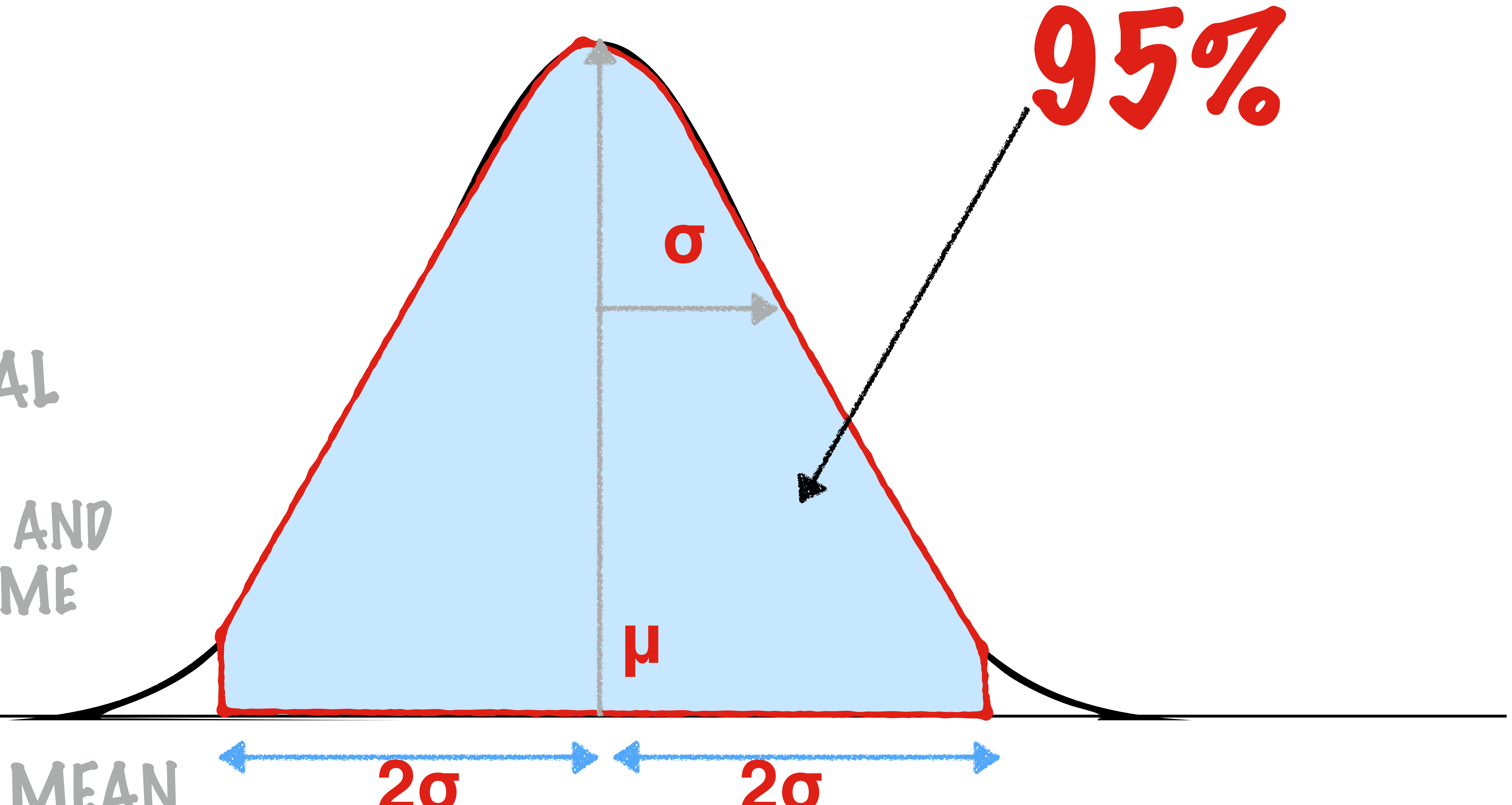
P(VALUE IS WITHIN 1 SD FROM THE MEAN) = 68%

THIS IS REGARDLESS OF THE VALUE OF MEAN, SD

NORMAL DISTRIBUTION

$$f(x) = F(x, \mu, \sigma)$$

THE SECOND COOL THING ABOUT NORMAL DISTRIBUTIONS IS THAT
REGARDLESS OF THE ACTUAL VALUES OF MEAN AND SD SOME CHARACTERISTICS REMAIN THE SAME



AS YOU MOVE FURTHER AWAY FROM THE MEAN, THE PROBABILITY DECREASES EXPONENTIALLY

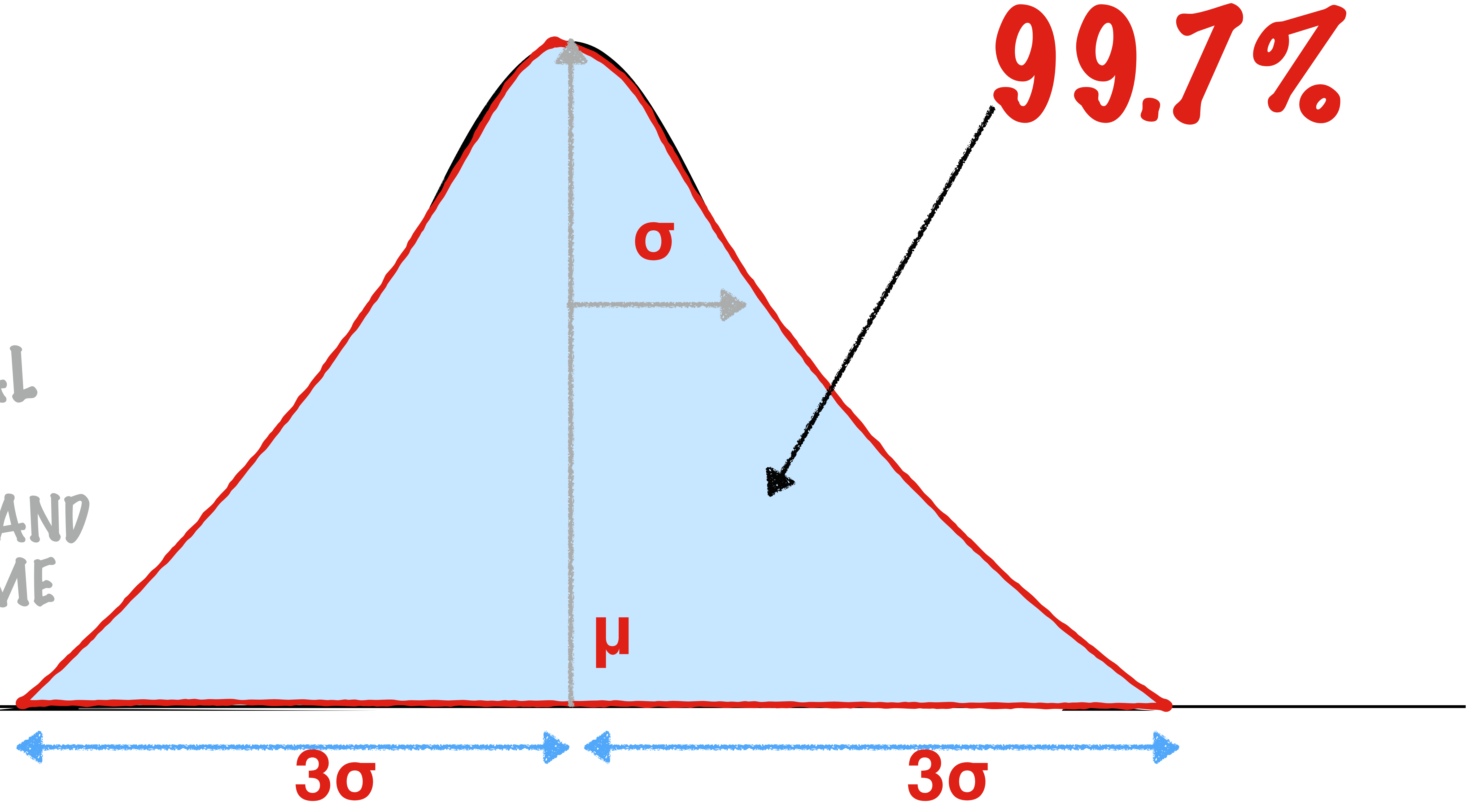
P(VALUE IS WITHIN 2 SD FROM THE MEAN) = 95%

THIS IS REGARDLESS OF THE VALUE OF MEAN, SD

NORMAL DISTRIBUTION

$f(x) = F(x, \mu, \sigma)$

THE SECOND COOL THING ABOUT NORMAL DISTRIBUTIONS IS THAT
REGARDLESS OF THE ACTUAL VALUES OF MEAN AND SD SOME CHARACTERISTICS REMAIN THE SAME



AS YOU MOVE FURTHER AWAY FROM THE MEAN, THE PROBABILITY DECREASES EXPONENTIALLY

P(VALUE IS WITHIN 3 SD FROM THE MEAN) = 99.7%

THIS IS REGARDLESS OF THE VALUE OF MEAN, SD

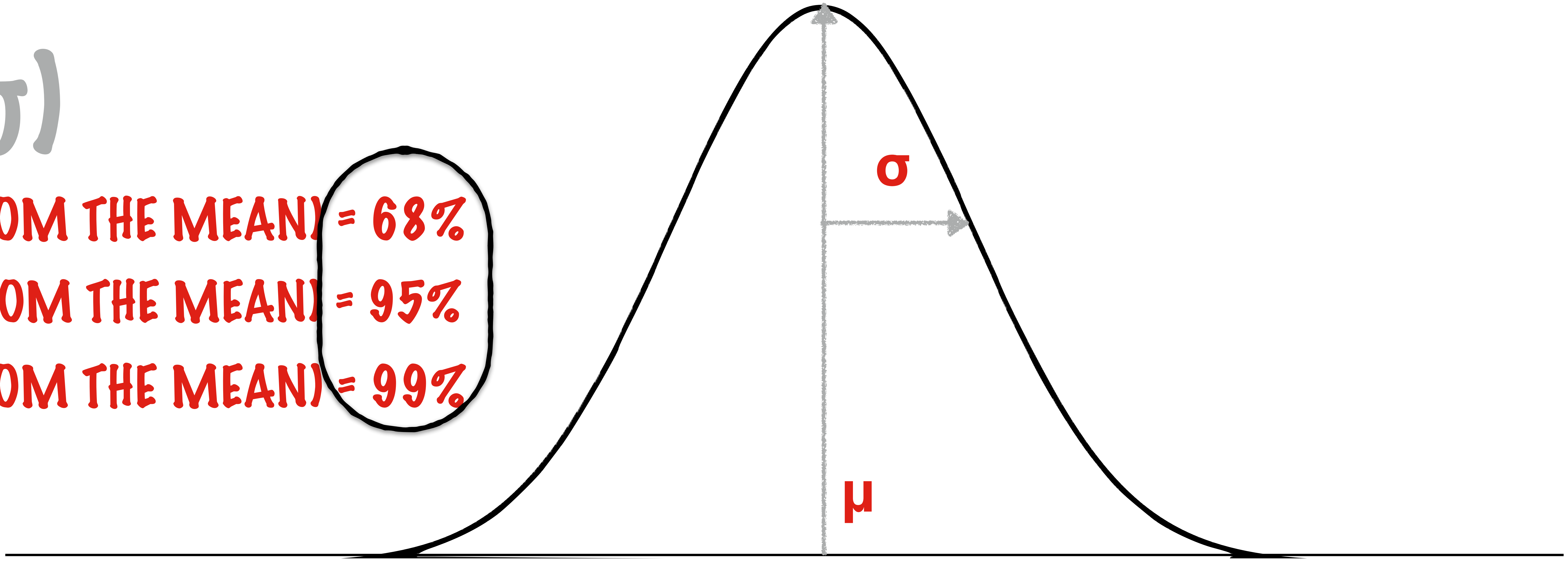
NORMAL DISTRIBUTION

$f(x) = F(x, \mu, \sigma)$

P(VALUE IS WITHIN 1 SD FROM THE MEAN) = 68%

P(VALUE IS WITHIN 2 SD FROM THE MEAN) = 95%

P(VALUE IS WITHIN 3 SD FROM THE MEAN) = 99%



THIS RULE IS VERY USEFUL FOR

1. TESTING WHETHER A DISTRIBUTION IS NORMAL

2. FINDING OUTLIERS: ANY VALUES MORE THAN 3σ AWAY FROM THE MEAN CAN BE TREATED AS OUTLIERS