METHOD 2: STANDARD DEVIATION

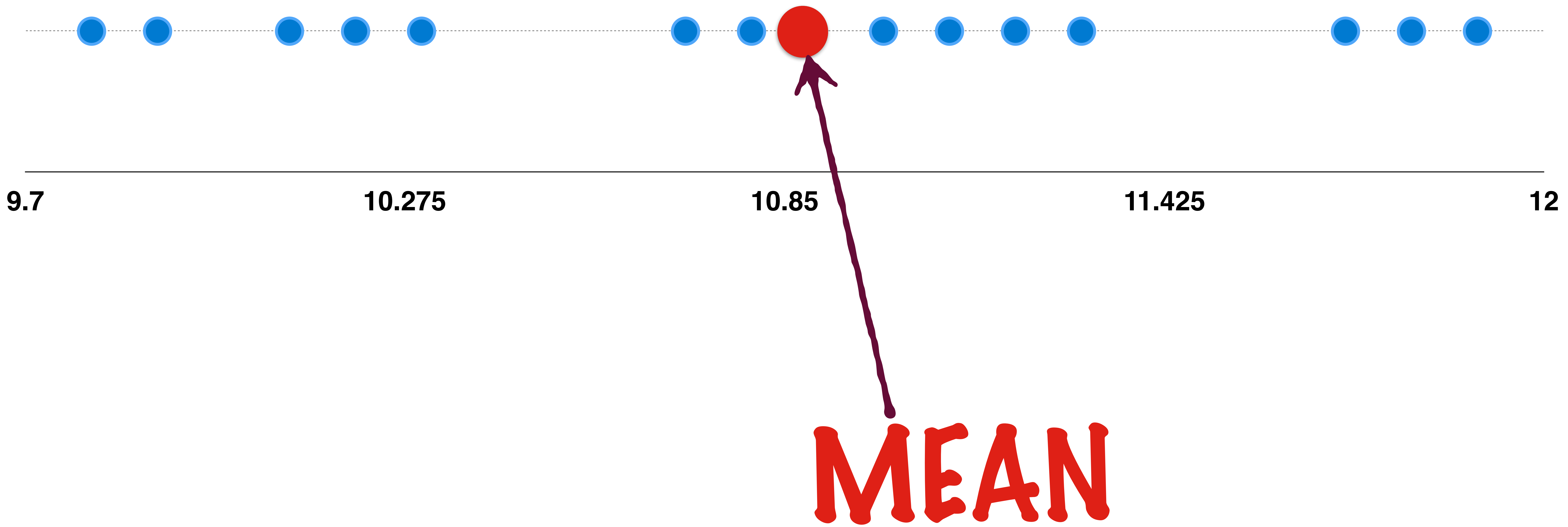
THE STANDARD DEVIATION IS A MEASURE OF DEVIATION FROM THE MEAN

METHOD 2: STANDARD DEVIATION

THE IDEA IS TO MEASURE **HOW FAR AWAY** EACH POINT IS FROM THE **MEAN** VALUE

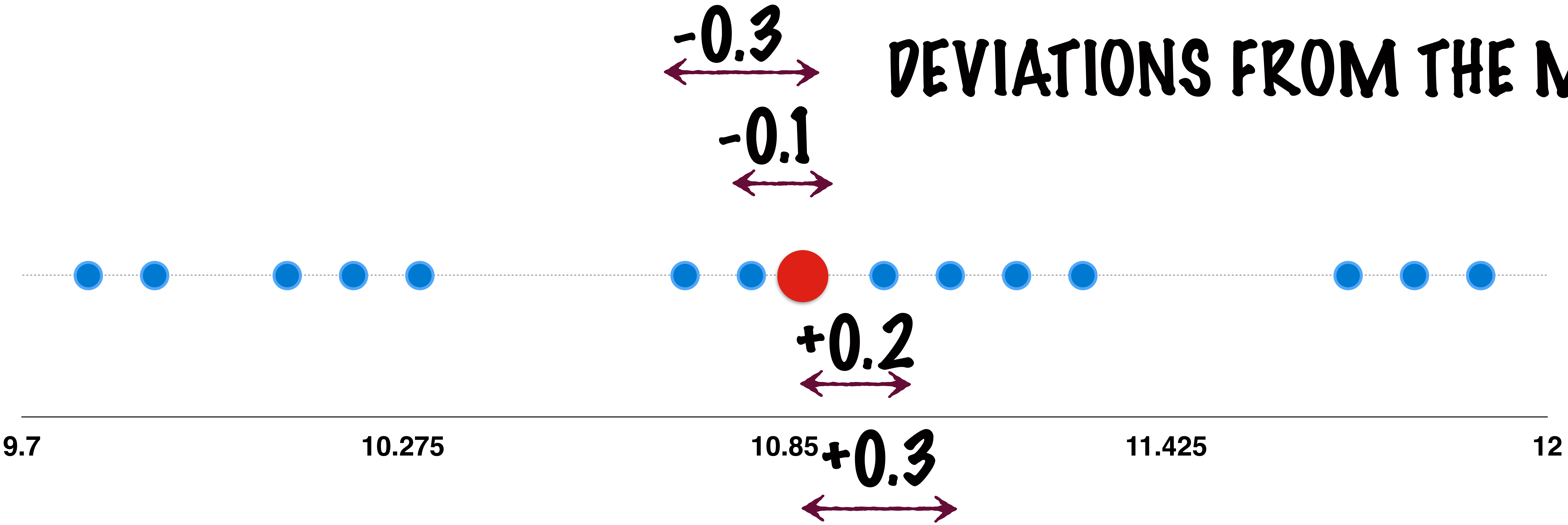
METHOD 2: STANDARD DEVIATION

HERE IS A DATASET



METHOD 2: STANDARD DEVIATION

DEVIATIONS FROM THE MEAN



IF YOU CALCULATED ALL SUCH DEVIATIONS

-1.1	-1.1	-1	-0.8	-0.8	-0.7	-0.6	-0.2	-0.1	-0.1	0.1	0.2	0.3	0.3	0.4	0.8	0.8	0.9	1	1

METHOD 2: STANDARD DEVIATION

DEVIATIONS FROM THE MEAN

-1.1	-1.1	-1	-0.8	-0.8	-0.7	-0.6	-0.2	-0.1	-0.1	0.1	0.2	0.3	0.3	0.4	0.8	0.8	0.9	1	1

THESE NUMBERS REPRESENT HOW FAR THE DATASET VARIES FROM THE MEAN

METHOD 2: STANDARD DEVIATION

DEVIATIONS FROM THE MEAN

-1.1	-1.1	-1	-0.8	-0.8	-0.7	-0.6	-0.2	-0.1	-0.1	0.1	0.2	0.3	0.3	0.4	0.8	0.8	0.9	1	1

IF WE CAN FIND 1 NUMBER TO SUMMARIZE THEM, THAT WOULD DESCRIBE THE "SPREAD"

METHOD 2: STANDARD DEVIATION

DEVIATIONS FROM THE MEAN

-1.1	-1.1	-1	-0.8	-0.8	-0.7	-0.6	~~-0.2~~	-0.1	~~-0.1~~	~~0.1~~	~~0.2~~	0.3	0.3	0.4	0.8	0.8	0.9	1	1

OPTION 1: MEAN OF THE DEVIATIONS

THIS ISN'T REALLY A GREAT OPTION AS THE DEVIATIONS WILL CANCEL EACH OTHER OUT WHEN THEY ARE ADDED

METHOD 2: STANDARD DEVIATION

DEVIATIONS FROM THE MEAN

-1.1	-1.1	-1	-0.8	-0.8	-0.7	-0.6	-0.2	-0.1	-0.1	0.1	0.2	0.3	0.3	0.4	0.8	0.8	0.9	1	1

OPTION 2: MEAN OF ABSOLUTE VALUE OF THE DEVIATIONS

METHOD 2: STANDARD DEVIATION

DEVIATIONS FROM THE MEAN

1.1	1.1	1	0.8	0.8	0.7	0.6	0.2	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.8	0.8	0.9	1	1

OPTION 2: MEAN OF ABSOLUTE VALUE OF THE DEVIATIONS

THIS CAN WORK BUT THERE IS AN EVEN BETTER OPTION

METHOD 2: STANDARD DEVIATION

DEVIATIONS FROM THE MEAN

-1.1	-1.1	-1	-0.8	-0.8	-0.7	-0.6	-0.2	-0.1	-0.1	0.1	0.2	0.3	0.3	0.4	0.8	0.8	0.9	1	1

OPTION 3: MEAN OF SQUARES OF THE DEVIATIONS

METHOD 2: STANDARD DEVIATION

DEVIATIONS FROM THE MEAN

1.1^2	1.1^2	1^2	0.8^2	0.8^2	0.7^2	0.6^2	0.2^2	0.1^2	0.1^2	0.1^2	0.2^2	0.3^2	0.3^2	0.4^2	0.8^2	0.8^2	0.9^2	1^2	1^2

OPTION 3: MEAN OF SQUARES OF THE DEVIATIONS

THIS IS A STANDARD MEASURE OF THE "SPREAD"

VARIANCE

METHOD 2: STANDARD DEVIATION

DEVIATIONS FROM THE MEAN

1.1^2	1.1^2	1^2	0.8^2	0.8^2	0.7^2	0.6^2	0.2^2	0.1^2	0.1^2	0.1^2	0.2^2	0.3^2	0.3^2	0.4^2	0.8^2	0.8^2	0.9^2	1^2	1^2

VARIANCE

WHY IS THE VARIANCE BETTER THAN JUST THE MEAN OF ABSOLUTE VALUES?

METHOD 2: STANDARD DEVIATION

WHY IS THE VARIANCE BETTER THAN JUST THE MEAN OF ABSOLUTE VALUES?

1. VARIANCE IS MORE SENSITIVE

IF THE DEVIATIONS WERE	MEAN OF ABSOLUTE VALUES	VARIANCE
$-2, 4$	$(2+4)/2 = \boxed{3}$	$(2^2+4^2)/2 = \boxed{10}$
$-3, 3$	$(3+3)/2 = \boxed{3}$	$((-3)^2+3^2)/2 = \boxed{9}$

METHOD 2: STANDARD DEVIATION

WHY IS THE VARIANCE BETTER THAN JUST THE MEAN OF ABSOLUTE VALUES?

2. VARIANCE DOES NOT RELY ON CONDITIONAL FUNCTIONS

METHOD 2: STANDARD DEVIATION

WHY IS THE VARIANCE BETTER THAN JUST THE MEAN OF ABSOLUTE VALUES?

3. VARIANCE HAS MANY COOL MATHEMATICAL PROPERTIES EX: NORMAL DISTRIBUTIONS HEAVILY RELY ON THE VARIANCE

METHOD 2: STANDARD DEVIATION

WHY IS THE VARIANCE BETTER THAN JUST THE MEAN OF ABSOLUTE VALUES?

4. UNLIKE IQR VARIANCE IS SENSITIVE TO OUTLIERS

SIMILAR TO HOW THE MEAN IS MORE SENSITIVE TO OUTLIERS THAN MEDIAN

METHOD 2: STANDARD DEVIATION

VARIANCE IS A VERY GOOD MEASURE OF THE SPREAD

BUT IT'S NOT OF THE SAME ORDER AS THE DATASET OR THE MEAN

METHOD 2: STANDARD DEVIATION

YOU CANNOT USE IT TO SAY

THE DATA VARIES MOSTLY BETWEEN

MEAN - X , MEAN + X

METHOD 2: STANDARD DEVIATION

STANDARD DEVIATION = SQRT(VARIANCE)

$$SD = \sqrt{\frac{\sum\left(x - \boxed{\overline{x}}\right)^2}{n}}$$

MEAN

METHOD 2: STANDARD DEVIATION

STANDARD DEVIATION = SQRT(VARIANCE)

$$SD = \sqrt{\frac{\sum\left(\boxed{x - \bar{x}}\right)^2}{n}}$$

DEVIATION FROM MEAN

METHOD 2: STANDARD DEVIATION

STANDARD DEVIATION = SQRT(VARIANCE)

$$SD = \sqrt{\boxed{\frac{\sum (x-\bar{x})^2}{n}}}$$

AVERAGE OF SQUARES OF DEVIATIONS

METHOD 2: STANDARD DEVIATION

STANDARD DEVIATION = SQRT(VARIANCE)

$$SD = \sqrt{\boxed{\frac{\sum (x - \bar{x})^2}{n}}}$$

VARIANCE

METHOD 2: STANDARD DEVIATION

STANDARD DEVIATION = SQRT(VARIANCE)

$$SD = \boxed{\sqrt{\frac{\sum (x - \bar{x})^2}{n}}}$$

SQRT(VARIA
NCE)

METHOD 2: STANDARD DEVIATION

STANDARD DEVIATION = SQRT(VARIANCE)

$$SD = \sqrt{\frac{\sum (x - \bar{x})^2}{n}}$$