1. A COMPONENT IS DEFECTIVE IF IT IS OVERSIZED. SAMPLES OF 500 COMPONENTS PRODUCED BY A MACHINE HAVE A MEAN SIZE OF 7.31 CM AND STANDARD DEVIATION OF 0.1 CM. IF THE MAXIMUM SIZE ACCEPTABLE IS 7.41 CM, DETERMINE HOW MANY COMPONENTS ARE DEFECTIVE, ASSUMING NORMAL DISTRIBUTION.

Given:

500 components

$\mu = 7.31$ cm

$\sigma = 0.1$ cm
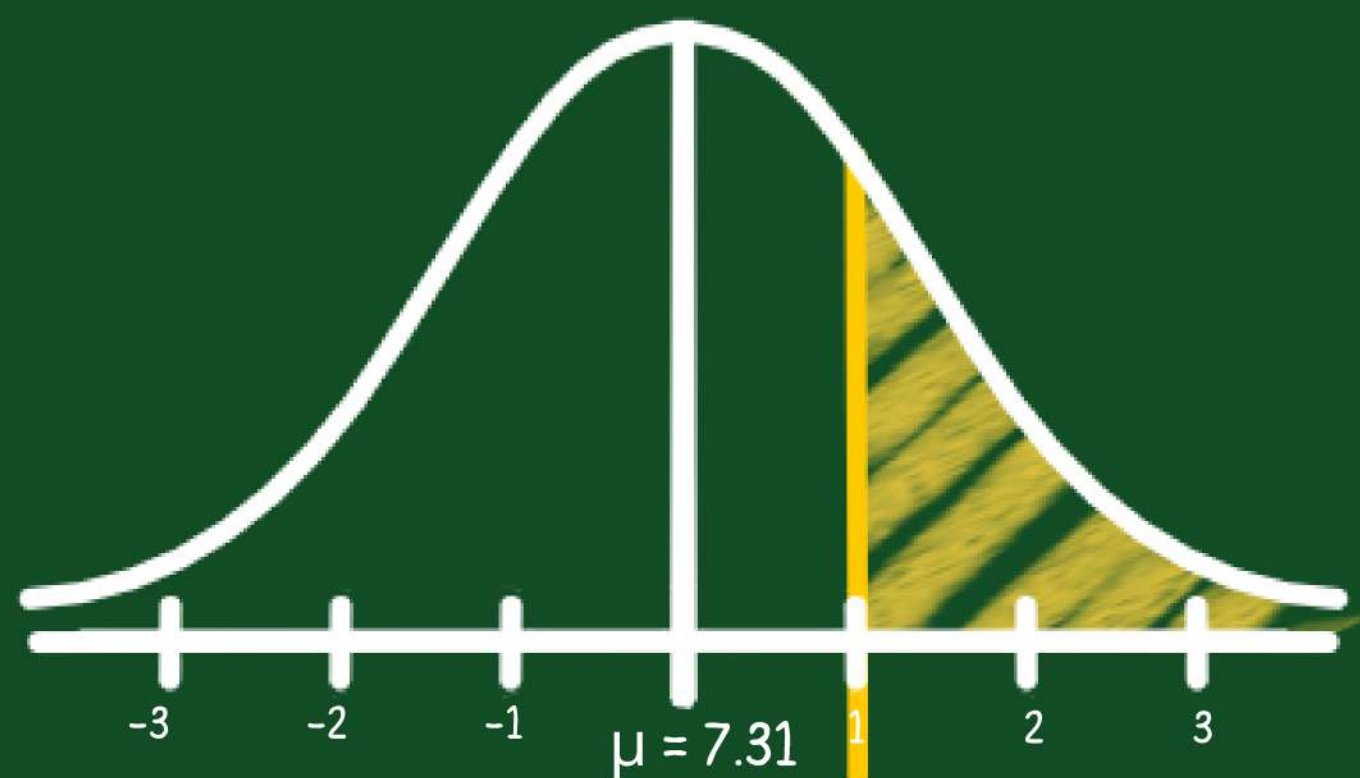
$x = 7.41$ cm

Getting the P-value:

$P(Z \geq 1) = 0.1587$ or 15.87%

Getting the z score:

$z = \dfrac{x - \mu}{\sigma}$

$z = \dfrac{7.41 - 7.31}{0.1}$

$z = 1$

Since we will get those that are oversized, it is best to use the right-tailed test p-value table.

$\mu = 7.31$

$x = 7.41$
$z = 1$

Based on Z table of $P(Z \geq 1)$, the area is **0.1587**

Getting the no. of defective components:

$0.1587 \times 500 = \mathbf{79.35}$

15.87% of the components are oversized. Therefore, out of 500 components, 79 components are defective.

2. A FRIEND CALCULATES A VARIANCE AND REPORTS THAT IT IS -25.00. HOW DO YOU KNOW THAT HE HAS MADE A SERIOUS CALCULATION ERROR?

Variance is a result of a **squared standard deviation** (σ^2) meaning that it cannot result into a negative value because multiplying any value by itself will be a **positive result**. Even the standard deviation is also considered as a **non-negative value** in the first place. That is why he made a serious mistake because he have a variance of **-25, a negative value** instead of a positive value.