Conditions

an automatic pouring machine is filling cans of liquid condenced milk of weight 32 oz. with SD 0.4. Due to defect in the machine some cans contain 31.50 oz. If 1000 such cans of condensed milk are imported, how many cans contain less amount of milk?

Solution

Consider the formula of standard deviation (SD):

$$\sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

For our case:

$$0.4 = \sqrt{\frac{1}{1000}\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

The summands, which are not equal to 0 (those, with defects), will be equal to 0.5*0.5=0.25, because 32-31.5=0.5. Assume, theirs quantity is y.

Then:

$$0.4 = \sqrt{\frac{1}{1000}0.25y}$$

$$0.16 = \frac{1}{1000}0.25y$$

$$160 = 0.25y$$

$$y = 640$$

Answer: 640 cans are with defect (contain 31.50 oz of milk)