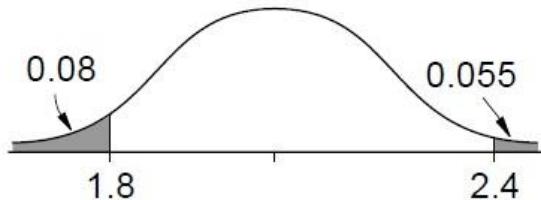


Answer on Question #44475-Physics-Other

A manufacturer does not know the mean and standard deviation of the diameters for the production of ball bearings. However, a viewing system rejects all bearing larger than 2.4 cm and those under 1.8 cm in diameter. Out of 1000 ball bearings 8% are rejected as too small and 5.5% as too big. Find the mean and standard deviation of the ball bearings produced.

Solution



Assume a normal distribution of

$$\Phi^{-1}(1 - 0.08) = 1.4;$$

so 1.8 is 1.4 standard deviations below mean.

Also

$$\Phi^{-1}(1 - 0.055) = 1.6,$$

so 2.4 is 1.6 standard deviations above mean.

This can be written as two simultaneous equations and solved:

$$\begin{cases} \mu + 1.6\sigma = 2.4 \\ \mu - 1.4\sigma = 1.8. \end{cases}$$

Subtracting,

$$3.0\sigma = 0.6 \rightarrow \sigma = 0.2.$$

Using the first equation,

$$\mu + 1.6 \cdot 0.2 = 2.4 \rightarrow \mu = 2.08.$$

So, the mean is $\mu = 2.08$ and the standard deviation is $\sigma = 0.2$.