## Answer on Question \#46081 - Math - Statistics and Probability

Steel rods are manufactured to be 3 inches in diameter but they are acceptable if they are inside the limit 2.99 inches and 3.01 inches. It is observed that 5\% are rejected as oversized and 5\% are rejected undersized. Assuming that the diameters are normally distributed, find the standard deviation of the distribution.

## Solution

Let $X$ denote the diameter of the rods in inches and let $X \sim N\left(\mu, \sigma^{2}\right)$.
Here we are given

$$
P(X<2.99)=0.05 \text { and } P(X>3.01)=0.05
$$

It is seen from the above table that the value of $Z$ for $10 \%$ level of significance is $Z= \pm 1.645$, as the $5 \%$ rejection region lies in two tails of the normal distribution, then we have

$$
\begin{gathered}
\frac{2.99-\mu}{\sigma}=-1.645 \text { and } \frac{3.01-\mu}{\sigma}=1.645 \\
3.01-\mu=1.645 \sigma \text { and } 2.99-\mu=-1.645 \sigma \\
\mu=3 \text { and } \sigma=0.006079
\end{gathered}
$$

Answer: 0.006079.

