**Answer on Question #57607 – Math – Statistics and Probability**

**Question**

Suppose that certain bolts have length L=400+X mm, where X is a random variable with density

$f(x)=3/4(1-x^2)$ if $-1 \leq x \leq 1$ and 0 otherwise.

Determine c so that with a probability of 95% bolt will have the length between 400-c and 400+c.

**Solution**

$$f(x) = \begin{cases} \frac{3}{4}(1-x^2), -1 \leq x \leq 1 \\ 0, otherwise \end{cases}$$

$$\int_{-c}^{c} f(x)dx = 0.95.$$

$$\int_{-c}^{c} f(x)dx = \int_{-c}^{c} \frac{3}{4}(1-x^2)dx = \frac{3}{4}\left(x - \frac{x^3}{3}\right)_{-c}^{c} = \frac{3}{4}\left(2c + \frac{(c)^3 - (-c)^3}{3}\right) = \frac{1}{2}(c + c^3) = 0.95$$

The solution of this cubical equation is

$$c = 0.974517.$$

**Answer: $0.974517$.**