Math-71 Sections 02, 03, 60

Homework #7 Solutions

Problem

You are working quality control for a manufacturer of screws. You are sampling a particular screw as it comes off of the line. You expect the length of the screw to follow a normal distribution as follows, where the mean and standard deviation are expressed in centimeters (cm):

$$p(x) = \frac{1}{0.1\sqrt{2\pi}} e^{-50(x-2)^2}$$

1. What is the mean of the screw length?

   $\mu = 2.0\,\text{cm}$

2. What is the standard deviation of the screw length?

   $\sigma = 0.1\,\text{cm}$

3. At what x value does the corresponding bell curve have its absolute maximum?

   $x = \mu = 2.0\,\text{cm}$

4. At what x values does the corresponding bell curve have its points of inflection?

   $x = \mu \pm \sigma = 1.9\,\text{cm}, 2.1\,\text{cm}$

5. What is the probability that a screw length will be between 1.8 and 2.2 cm?

   Since this is in the 2σ range, the probability is 95%.