A stamping machine produces 'can tops' whose diameters are normally distributed with a standard deviation of 0.02 inch. At what nominal mean diameter should the machine be set, so that no more than 9 % of the 'can tops' produced have diameters exceeding 3.5 inches?

Solution

Let X be the diameter of a can top produced by the machine, then X is assumed a normal distribution with to - be-determined mean μ and standard deviation 0.01. From the question we need to consider $P(X > 3.5) < 0.09$.

So we solve

$$0.09 > P(X > 3.5) = P\left(Z > \frac{3.5 - \mu}{0.02}\right).$$

From tables on the standard normal distribution, we have $\frac{3.5-\mu}{0.02} > 1.34$, and therefore it should be set

$\mu < 3.473$ inch.