Answer on Question #44152, Math, Statistics and Probability

The mean weight of chicken in a chicken dinner at a fast food restraint is 10 ounces with standard deviation of 0.5 ounces. Using the distribution of sample means, what is the probability that the average chicken weight in a sample of 100 dinners will differ from the mean by more than 0.03 ounces?

Remark.

We suppose that weight of chicken is distributed normally.

Solution.

The weight of chicken is distributed normally with mean $\mu = 10$ and standard deviation $\sigma = 0.5$, $X \sim N(\mu, \sigma)$. Them it is know the average chicken weight in a sample of 100 dinners is distributed normally $\bar{X}_{100} \sim N(\mu, \frac{\sigma}{\sqrt{n}})$ or $\bar{X}_{100} \sim N(10, 0.05)$. The corresponding transformation formula is

$$Z = \frac{\bar{X}_{100} - \mu}{\frac{\sigma}{\sqrt{n}}} \sim N(0,1).$$

$P(|\bar{X}_{100} - 10| > 0.03) = 1 - P(|\bar{X}_{100} - 10| < 0.03) = 1 - P(|Z| < 0.6) \approx 1 - 0.452 = 0.548.$

Answer. $0.548.$