

A popular softdrink is sold in 350 ml bottles. In the filling process, they use a machine that will fill the bottle with an amount that varies according to a normal distribution with mean μ and standard deviation σ . The mean μ can be controlled whereas the standard deviation $\sigma = 3$ [ml]. In order to insure that “few” bottles are sold with less than 350 [ml], μ is generally selected to be higher than 350 [ml], but in order to maximize their profit and avoid overfilling the bottles it is crucial that μ is not set higher than necessary to avoid lawsuits.

a) If $\mu = 352$ [ml] what is the probability that a bottle is sold with less than the advertised content?

b) How should they choose μ if they want no more than 10% of the bottles to be sold with less than the advertised content?

c) A bottle can contain no more than 360 [ml]. With the value of μ found in the previous question, what is the probability that a bottle will be overfilled?

d) The bottles are also sold in 6-packs and cases of 24. Find the probability that the average content per bottle is less than the advertised content for a 6-pack and a 24-pack and compare with b).