

7.88

Aluminum cans contaminated by fire. A gigantic warehouse located in Tampa, Florida, stores approximately 60 million empty aluminum beer and soda cans. Recently, a fire occurred at the warehouse. The smoke from the fire contaminated many of the cans with black-spot, rendering them unusable. A University of South Florida statistician was hired by the insurance company to estimate p , the true proportion of cans in the warehouse that were contaminated by the fire. How many aluminum cans should be randomly sampled to estimate the true proportion to within .02 with 90% confidence?

$$CI_{90\%}(p) = \left(\hat{p} \pm \underbrace{z_{0.05}}_{1.645} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \right)$$

$$0.02 > 1.645 \cdot \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} > 1.645 \sqrt{\frac{0.5^2}{n}} \Rightarrow$$

$$\Rightarrow n > \frac{1.645^2}{0.02^2} \cdot 0.5^2 = 1691$$