Choosing a Sample Size for Confidence Intervals

1. The Gallup Poll plans to ask a random sample of adults whether they attended a religious service in the last 7 days. How large a sample would be required to obtain a margin of error of at most 0.01 in a 99% confidence interval for the population proportion who would say that they attended a religious service? Show your work.

$$2.576\sqrt{\frac{(.5)(.5)}{n}} \le .01$$

$$n \ge 16589.44$$

$$\boxed{n \ge 16,590}$$

2. A lab supply company sells pieces of Douglas fir 4 inches long and 1.5 inches square for force experiments in science classes. From experience, the strength of these pieces of wood follows a Normal distribution with standard deviation 3000 pounds. You want to estimate the mean load needed to pull apart these pieces of wood to within 1000 pounds with 95% confidence. How large a sample is needed? Show your work.

$$1.96\left(\frac{3000}{\sqrt{n}}\right) \le 1000$$

$$n \ge 34.5744$$

$$\boxed{n \ge 35}$$

3. The body mass index (BMI) of all American young women is believed to follow a Normal distribution with a standard deviation of about 7.5. How large a sample would be needed to estimate the mean BMI μ in this population to within ± 1 with 99% confidence? Show your work.

$$2.576\left(\frac{7.5}{\sqrt{n}}\right) \le 1$$

$$n \ge 373.2624$$

$$\boxed{n \ge 374}$$