Practice:

4-14) *Swain v. Alabama*
In *Swain v. Alabama* (1965) it was alleged that there was discrimination against blacks in grand jury selection. Swain, a black man, was convicted in Talladega County, Alabama, of raping a white woman and was sentenced to death. At that time in Alabama, only men over the age of 21 were eligible for jury duty. Census data suggested that about 26% of those eligible for grand jury service were black, yet a "random sample" of 1050 individuals called to appear for possible grand jury duty yielded only 177 blacks.
(a) Produce numerical and graphical summaries of the sample results.
(b) Define the parameter of interest.
(c) State the null and alternative hypotheses.
(d) Describe what a Type I Error and a Type II Error would represent in this situation. What are the consequences of each type of error?
(e) Is the normal model valid here? If so, use the central limit theorem to calculate the test statistic and p-value (include a sketch). If not, calculate the p-value based on the binomial distribution.
(f) Do you reject or fail to reject the null hypothesis based on this p-value? The Supreme Court ruled that this disparity was small. Do you agree with this decision?

4-15) Cat Ownership
A survey of 80,000 households conducted by the American Veterinary Medical Association in 1996 found 27.3% of households reported that they owned a pet cat.
(a) State (in words and in symbols) the hypotheses for testing whether the sample data provide strong evidence that the proportion of all households that own a pet cat *differs* from .25. *Hint*: Think *two-sided*.
(b) Use the central limit theorem to calculate the test statistic and a two-sided p-value. State your conclusion about the null hypothesis and about the research question. How strong is the evidence against the null hypothesis?
(c) Does 27.3% versus 25% seem like a large difference to you in this context?

Discussion: Keep in mind the difference between *statistical significance* and *practical significance*. With large sample sizes, the standard deviation of the sample proportion will be small, and so even small differences will be statistically significant. Saying a sample result is unlikely to happen by chance is not the same as saying the result is important or even noteworthy depending on the context involved.