Stop signs  Highway safety engineers test new road signs, hoping that increased reflectivity will make them more visible to drivers. Volunteers drive through a test course with several of the new and old style signs and rate which kind shows up the best.

(a) What are the null and alternative hypotheses to be tested (in terms of the proportion of people who find one sign or the other to be more noticeable)?

(b) What would a Type I error be in this test?

(c) What would a Type II error be in this test?

(d) In this context, what is meant by the power of the test?

(e) If the hypothesis is tested at the 1% level of significance instead of the 5% level, how will this affect the power of the test?

(f) The engineers hoped to base their decision on the reactions of 50 drivers, but time and budget constraints may force them to cut back to 20. How would this affect the power of the test? Explain.
Answer to Stop signs

(a) $H_0 : p = .5$, $H_a : p > .5$, where $p$ is the fraction of people who find the new style to be more noticeable.

(b) Deciding the signs are more visible when they are not.

(c) Failing to decide the signs are more visible when they are.

(d) Probability of detecting that a more visible sign is more visible.

(e) Decrease power because you’ll need stronger evidence to reject $H_0$.

(f) It will decrease power by making the standard error larger.