Homework Solutions
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Exercise 34

(a) Let p_1 be the proportion of Wallace cars with the metro sticker and p_2 be the proportion of Humphrey cars with the metro sticker. The hypotheses are

$$\begin{aligned} H_0 &: \quad p_1 = p_2 \\ H_1 &: \quad p_1 < p_2 \end{aligned}$$

(b) The sample proportion $\hat{p}_1$ (Wallace) is $\frac{270}{361} = 0.7479$ and the sample proportion $\hat{p}_2$ (Humphrey) is $\frac{154}{178} = 0.8652$.

(c) We have done Step 1 in part (a). We will continue with steps 2 through 7.

2. $\alpha = 0.01$.
3. The test statistic is
$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}},$$
where $\hat{p}$ is the pooled estimate of p.
4. We first calculate
$$\hat{p} = \frac{270 + 154}{361 + 178} = \frac{424}{539} = 0.7866.$$
Then compute
$$\begin{aligned} z &= \frac{0.7479 - 0.8652}{\sqrt{(0.7866)(0.2134)\left(\frac{1}{361} + \frac{1}{178}\right)}} \\ &= -\frac{0.1173}{0.0375} \\ &= -3.126. \end{aligned}$$
5. p-value = `normalcdf(-E99,-3.126)` $= 8.8607 \times 10^{-4}$.
6. Reject H_0.
7. A lower proportion of Wallace supporters have the metro sticker than do Humphrey supporters.

(d) Skip.

(e) Skip.