Does labeling menus reduce calories?

STATE $\mu_1 - \mu_2$ → true difference in mean calorie intake

$H_0: \mu_1 - \mu_2 = 0$

$H_a: \mu_1 - \mu_2 < 0$

$\alpha = 0.05$

statistic $\bar{x}_1 - \bar{x}_2 = 225 - 265$

$= -40$ calories

PLAN TWO Sample t test for $\mu_1 - \mu_2$

Random
"random sample of 30 (and 40) receipts" ✓

10%
$30 < \frac{1}{10}$ (all receipts)
$40 < \frac{1}{10}$ (all receipts) ✓

Normal – Large Sample
$30 \geq 30$
$40 \geq 30$ CLT ✓

DO $\mu_1 - \mu_2 = 0$ $s_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{100^2}{30} + \frac{75^2}{40}}$

$= 21.77$

$t = \frac{\bar{x}_1 - \bar{x}_2 - 0}{s_{\bar{x}_1 - \bar{x}_2}} = \frac{-40 - 0}{21.77} = -1.84$

P-value = 0.038

or 2 Samp T Test gives $t = -1.84$ and P-value = 0.036 using df = 51.8

Conclude

We reject H_0 since P-value of .038 < $\alpha = .05$.

∴ There is convincing evidence that the average calories per receipt at a store with a labeled menu is less than at a store without labeled menus.

Alternative conclusion / interpretation
Assuming there is no difference in the avg. number of calories between the stores, there is a 0.038 prob. of getting a difference of −40 calories or less just by chance alone