The nutrition label for Oriental Spice Sauce states that one package of sauce has 1190 milligrams of sodium. To determine if the label is accurate, the FDA randomly selects two hundred packages of Oriental Spice Sauce and determines the sodium content. The sample has an average of 1167.34 milligrams of sodium per package with a sample standard deviation of 252.94 milligrams.

$\alpha = .01$

$H_0 \rightarrow \mu = 1190$

$H_a \rightarrow \mu \neq 1190$

$t \rightarrow 2.576$

$$t = \frac{1167.34 - 1190}{252.94 / \sqrt{200}} = -1.27$$

$= 1236.0732$

$= 1143.9268$

Researchers studying the effects of diet on growth would like to know if a vegetarian diet affects the height of a child. The researchers randomly selected 12 vegetarian children that were six years old. The average height of the children is 42.5 inches. The average height for all six-year-old children is 45.75 inches with a standard deviation of 3.8 inches.

$H_0 \rightarrow \mu = 45.75$ $\alpha = 0.01$

$H_a \rightarrow \mu \neq 45.75$ Z-Score = 2.576

$$\left| \frac{42.5 - 45.75}{\frac{3.8}{\sqrt{12}}} \right| = 2.96$$

$\boxed{\text{Reject}}$


-2,96
-2,576
2,576

Testing a Hypothesis about a Population Proportion, p

Assumptions:

1. The data is obtained via a random sample of size n.
2. The conditions for a binomial random variable are met. That is, there is a fixed number n of independent trials with only two possible outcomes on each trial, referred to as a success or failure. The probability of success on any trial is the same.
3. The conditions $\boxed{\cancel{np_0 \geq 10 \text{ and } n(1-p_0) \geq 10}}$ are both satisfied.

$np \geq 10$

$n(1-p) \geq 10$

Test Statistic:

The test statistic is given by

$$z = \frac{\hat{p} - p_0}{\sigma_{\hat{p}}}, \text{ where } \sigma_{\hat{p}} = \sqrt{\frac{p_0(1-p_0)}{n}},$$

p_0 = the population proportion (the value used in the null hypothesis),

n = the sample size, and

$\hat{p}$ = the sample proportion.

PROCEDURE

A socially conscious corporation wants to relocate their headquarters to another part of town. One concern expressed by workers is that their commuting distance will increase. The corporation has decided that if more than 50% of the employees will have to drive farther to the proposed new location, they will cancel the move. In a random sample of 398 employees, 201 indicated that their commuting distance to the new office will be longer. Based on the sample data, should the corporation cancel the move? Use a significance level of 0.01.

$\hat{p} = \frac{201}{398} = .505$

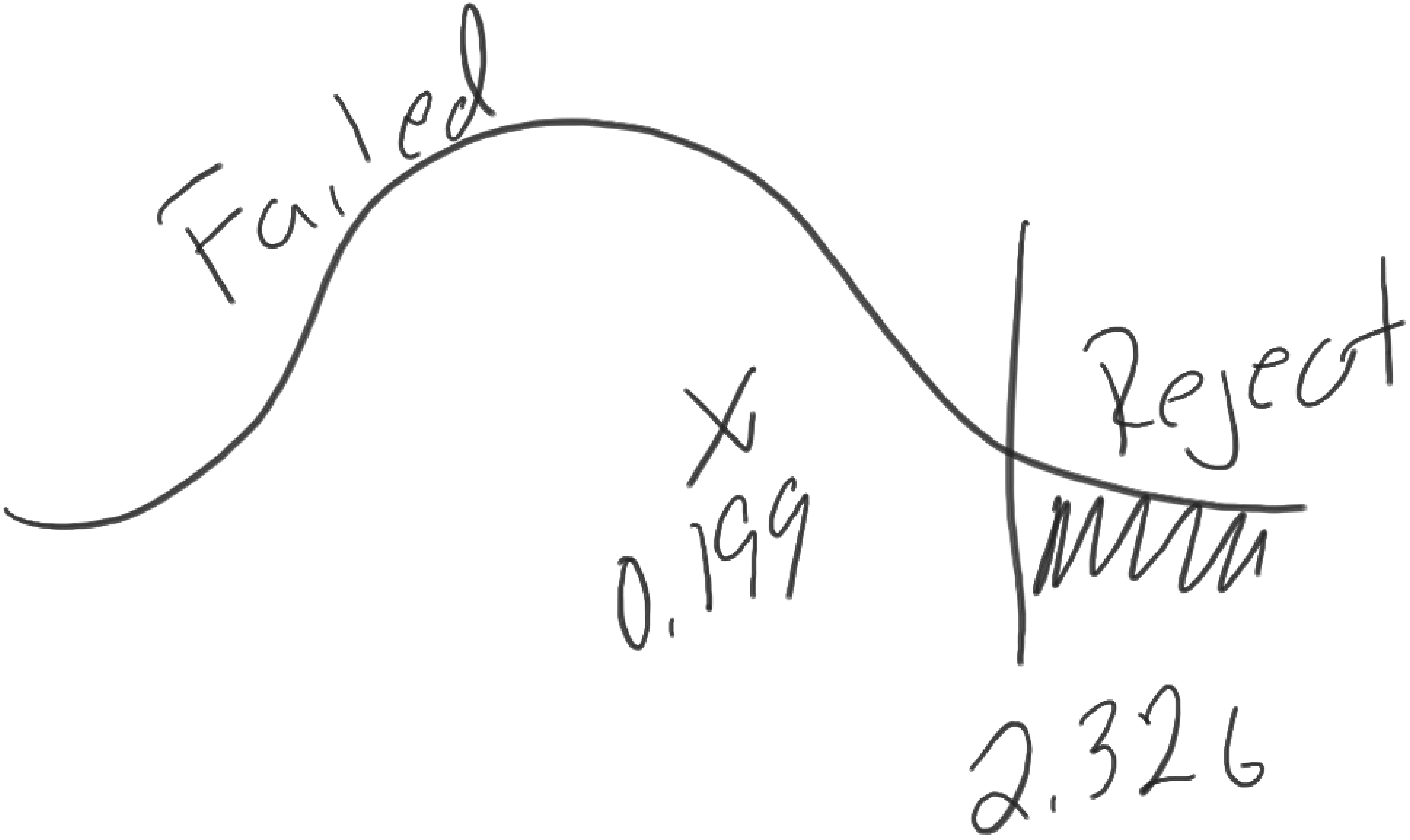
$H_0 \rightarrow p = .50$

$H_a \rightarrow p > .50$

$\alpha = 0.01$

$z = 2.326$

$z = \frac{.505 - .50}{\boxed{\sqrt{\frac{.50(1-.50)}{398}}}} = 0.199$


Failed
Reject
0.199
2.326

The length of time that a storm window will last before beginning to leak is of interest to a window manufacturer who wishes to guarantee his windows. He believes that more than 50% of the windows will last at least four years. To research this, 931 windows, which were installed at least four years ago, are randomly selected and checked for leakage. Five hundred of the windows are found to still be leak-free.

$\hat{p} = \frac{500}{931} = 0.537$

$H_0 \Rightarrow p = .50$

$H_a \Rightarrow p > .50$

$\alpha = 0.05$

$z = 1.645$

$$\frac{\overset{\hat{p}\ -\ p}{.537 - .5}}{\sqrt{\frac{.5(.5)}{931}}} = 2.26$$

$p(1-p)$

n

Reject

Bombay Charlie's, a fast food Indian restaurant, is thinking about adding a certain spice to their chicken curry dish to attract more customers. The restaurant manager has decided to add the spice if more than 80% of his customers prefer the taste of the chicken curry with the spice added. Sixty-five customers are randomly selected to participate in a blind taste test. Fifty-four of these customers prefer the chicken curry with the added spice.

In preparation for upcoming wage negotiations with the union, the managers for the Bevel Hardware Company want to establish the time required to assemble a kitchen cabinet. A first line supervisor believes that the job should take 45 minutes on average to complete. A random sample of 125 cabinets has an average assembly time of 47 minutes with a standard deviation of 10 minutes. Is there overwhelming evidence to contradict the first line supervisor's belief at a 0.05 significance level? Discuss the statistical and practical significance for this problem.

$H_0 \rightarrow \mu = 45$

$H_a \rightarrow \mu \neq 45$

$\alpha = 0.05$

$t = \dfrac{47-45}{10/\sqrt{125}} = \boxed{2.236}$

$t = 1.96$

Reject