

# VICTORIAN PIZZA FREE PIZZA DELIVERY ANALYSIS

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## Company Background

Victorian Pizza (VP) is a small pizzeria located near the campus of Big Western University (BWU) and is best known for offering quality pizza and drinks to college students and faculty at a fair price.

## Project Scope

VP management is interested in encouraging increased pizza sales and is exploring several options. One of these options is changing VP's current delivery service, which charges a flat \$2.50 per order regardless of quantity, to instead offer free delivery for orders that include at least two large or extra-large pizzas. It is believed that this change will encourage customers to place larger orders. We have been tasked with determining the validity of this proposal.

## Part 1 – Setting Up the Hypothesis Test

Question: Will offering free delivery for orders including at least two large or extra-large pizzas result in customers placing more large orders?

Null Hypothesis ( $H_0$ ): Offering free delivery will not result in customers placing more large orders.

Alternate Hypothesis ( $H_a$ ): Offering free delivery does result in customers placing more large orders.

Test Statistic: We will temporarily offer free delivery for a period of 30 days, then compare the volume of sales during that period with a prior 30-day period without free delivery to determine the percentage of change in larger orders placed.

Error Mitigation		
Error Type	Downside/risk of error	Current Parameters
Type I (false positive)	Risk is we continue to believe that offering free delivery on larger orders increases quantity of larger orders	$\alpha = 0.05$
Type II (false negative)	Risk is we conclude free delivery does not increase larger orders, when another factor may be responsible for reduced order volume	Increase sample size; i.e. offer free delivery for 60 days and compare with a prior 60-day period without free delivery

## Part 2 – Testing, Analysis, and Conclusions

To test the hypothesis, sales volume data from two different 30-day periods was collected – one period that included delivery charges for large orders, and one period that included free delivery for large orders. A test for two means was selected, and data entered into the Test Templates Workbook which accompanies this report.

$$H_0: \bar{x} = \mu_0$$

$$H_a: \bar{x} > \mu_0$$

$$\alpha = 0.05$$

p-values     Using T.DIST, right tail = 0.046568216  
                  Using T.TEST, right tail = 0.043976635

Can  $H_0$  be rejected?     At the 0.05 confidence level, using T.DIST = Yes  
                                  At the 0.05 confidence level, using T.TEST = Yes

Conclusion: The null hypothesis can be rejected, but just barely. It appears offering free delivery may result in an increase in the quantity of larger orders placed. However, the narrow difference makes it difficult to support the alternate hypothesis conclusively.

Unexpected findings:

- While the mean number of large orders placed with paid delivery was higher than with free delivery, the standard deviation for paid delivery was wider than with free delivery. This appears to support a thought that customers who expect to pay for delivery on every order regardless of size will order to meet their specific need; i.e. customers who do not need a large order will not order it because there is no savings incentive to do so.
- Conversely, the narrower standard deviation for free delivery orders would appear to support a thought that when given a choice of paid or free delivery that customers will consistently place orders for the same size; i.e. customers will tend to always place small orders or large orders regardless of need. But, the lower average for larger orders with free delivery appears to cloud this line of thinking.