29-Minutes Guarantee

Status	Number of delive	Percentage of deliveries
Late	45	13.89%
On time	279	86.11%
Grand Total	324	100.00%

By creating a pivot table of deliveries by status (late and on time), it is seen that the percentage of late deliveries equals to 13.89% that exceeds the 5% break-even point of free pizzas given away due to late deliveries. It can already be suspected that a 29-minute guarantee should not be offered on Pronto deliveries. However, we also need to prove it statistically.

	Hypotheses
H_0:	$p_{(late\ deliveries\ proportion)} \leq 5$
H_A:	$p_{(late\ deliveries\ proportion)} > 5$
$\hat{p}$	0.138888889
p_0	0.05
Sample size	324
Z-value	7.341303484
P-value	1.05804E-13
Result:	Reject H_0 hypothesis as 1.05804E-13 < 0.05

The proportion hypothesis test was conducted to test whether the proportion percentage of late deliveries exceeds 5%.

Null hypothesis - proportion is less or equal to 5%.

Alternative hypothesis - proportion is greater than 5%.

Test statistic - Z-test

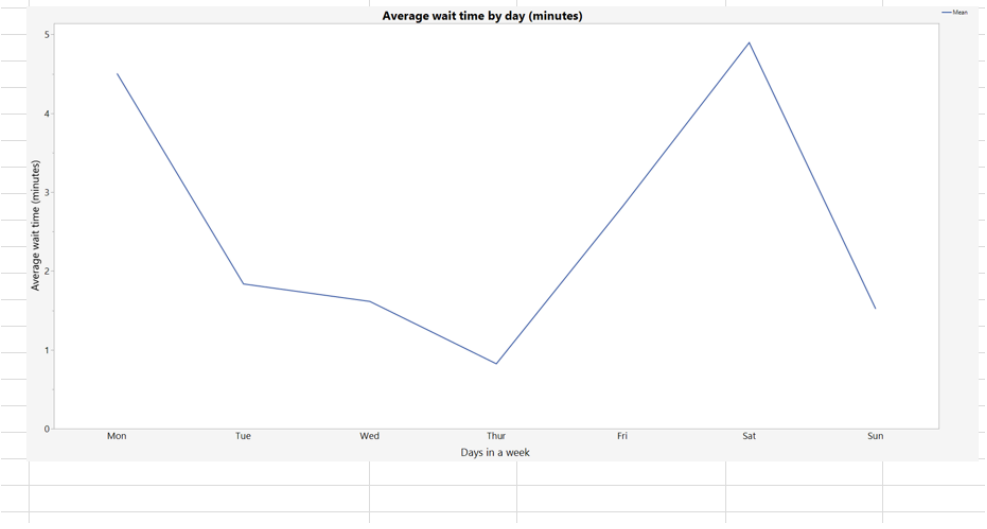
After conducting the hypothesis test, we had enough evidence to reject the Null Hypothesis in favor of Alternative Hypothesis and conclude that the proportion percentage of late deliveries exceeds 5% and it is not recommended to provide a 29-minutes guarantee on Pronto deliveries.

Recommendations for improvement

Late and On time deliveries by day			
Days	Late	On time	Grand Total
Mon	2	9	11
Tue	2	29	31
Wed	2	21	23
Thur		54	54
Fri	15	78	93
Sat	23	53	76
Sun	1	35	36
Grand Total	**45**	**279**	**324**

Despite the fact that 2 additional drivers have been hired to reduce delays in deliveries on Fridays and Saturdays, these days still experience the highest number of late deliveries compared to other weekdays.

Days	Average of PrepTime	Average of WaitTime	Average of TravelTime	Average of TotalTime
Mon	14.64818182	4.505454545	7.547272727	26.70090909
Tue	14.68774194	1.835806452	8.016129032	24.53967742
Wed	14.76173913	1.613913043	8.20826087	24.58391304
Thur	15.09981481	0.822777778	7.779444444	23.70203704
Fri	15.20172043	2.82172043	8.408924731	26.43236559
Sat	15.21802632	4.897368421	8.127236842	28.24263158
Sun	15.42638889	1.520833333	7.683055556	24.63027778
Grand Total	**15.11432099**	**2.707993827**	**8.076203704**	**25.89851852**



Friday has a lowest average wait time of delivery, however Saturday and Monday still experience a relatively average high wait time. It can be recommended to hire

more drivers, especially for Saturday and Monday, to reduce the delay in wait time.

Average preparation and travel time of pizzas is relatively similar for each day and can’t be improved. Usage of GPS maps to find more efficient routes for drivers might reduce travel time, however the travel time might be affected by the traffic and other factors that can’t be changed.