

A/B Test: Fast-Food Weekly Sales

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Objectives & Hypothesis

Business objective:

- Determine which of three marketing promotions drives the greatest lift in weekly sales per store.

Primary KPI:

- Average weekly sales per location (in \$000s).

Hypothesis:

1. H_1 : Promotion A will provide a statistically significant uplift vs. Promotion B & Promotion C.
2. H_2 : Promotion B and Promotion C will show no significant difference.

About the Data

Scenario:

- A fast-food chain tested three different promotions for a new menu item across randomly selected locations.
- Weekly sales of the new item were recorded for four consecutive weeks.

Goal:

- Identify which promotion drives the highest lift in weekly sales per store.

Dataset details:

- Observations: ~1,600 rows (400 locations × 4 weeks)
- Source: BigQuery sales_data.promotions

Columns:

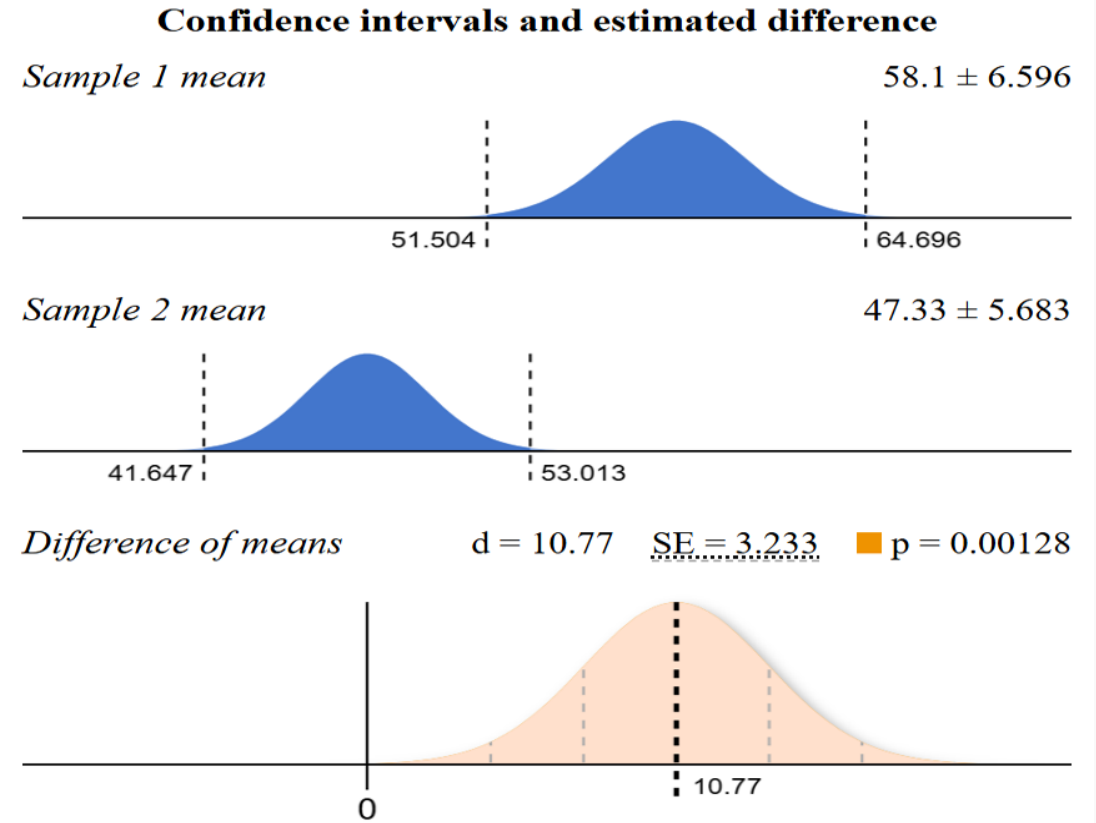
- MarketID — Unique market identifier
- MarketSize — Total market sales volume
- LocationID — Unique store identifier
- AgeOfStore — Store age (years)
- Promotion — Campaign label (A, B, or C)
- Week — Week number (1–4)
- SalesInThousands — Weekly sales of the new item (in \$000s)

Findings: Promotion 1 vs. 2

Promotion A lifts weekly sales by +\\$10.77K vs. B (95% CI: [\\$10.50K, \\$11.04K], $p = 0.0013$)

Key Stats:

- **Mean lift:** +\\$10.77 K
- **95% CI:** [\\$10.50 K, \\$11.04 K]
- **p-value:** 0.0013 (< 0.01)

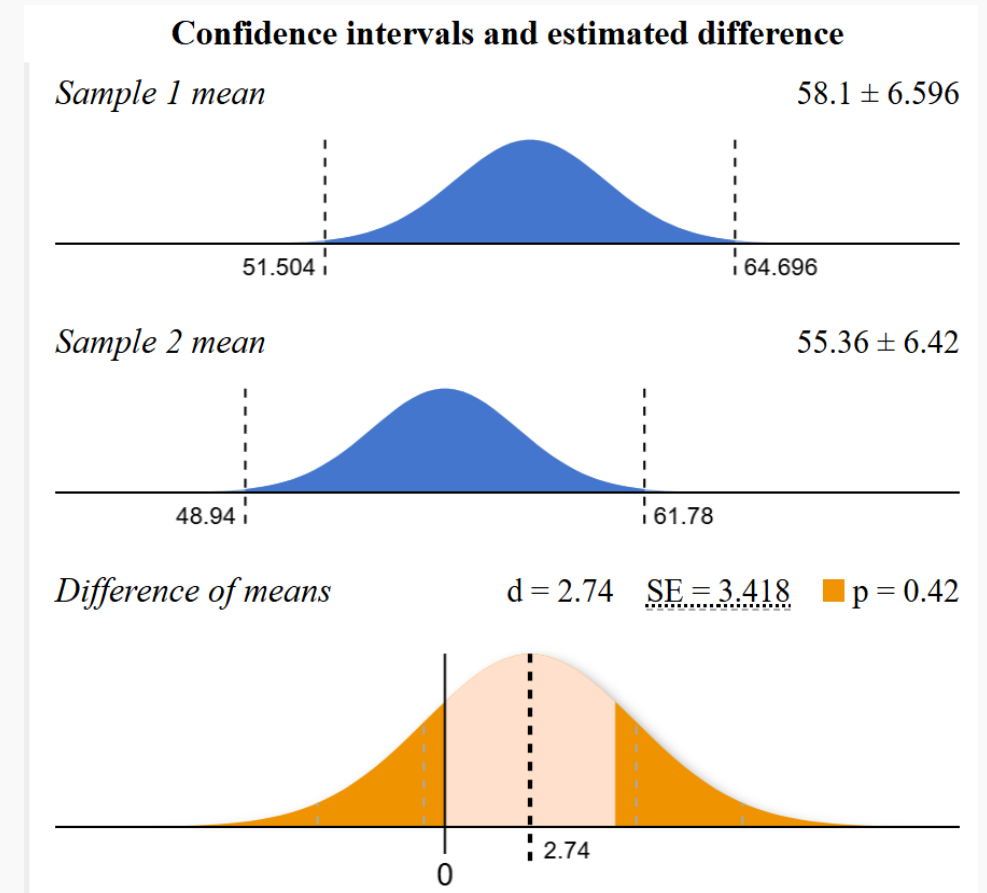


Findings: Promotion 1 vs. 3

Promotion 1 yields +\\$2.74K/week vs. Promotion 3 ($p = 0.4259$; not significant)

Key Stats:

- **Mean lift:** +\\$2.74 K
- **95% CI:** -\\$0.50 K, +\\$6.00 K]
- **p-value:** 0.4259 (> 0.01 , not significant)

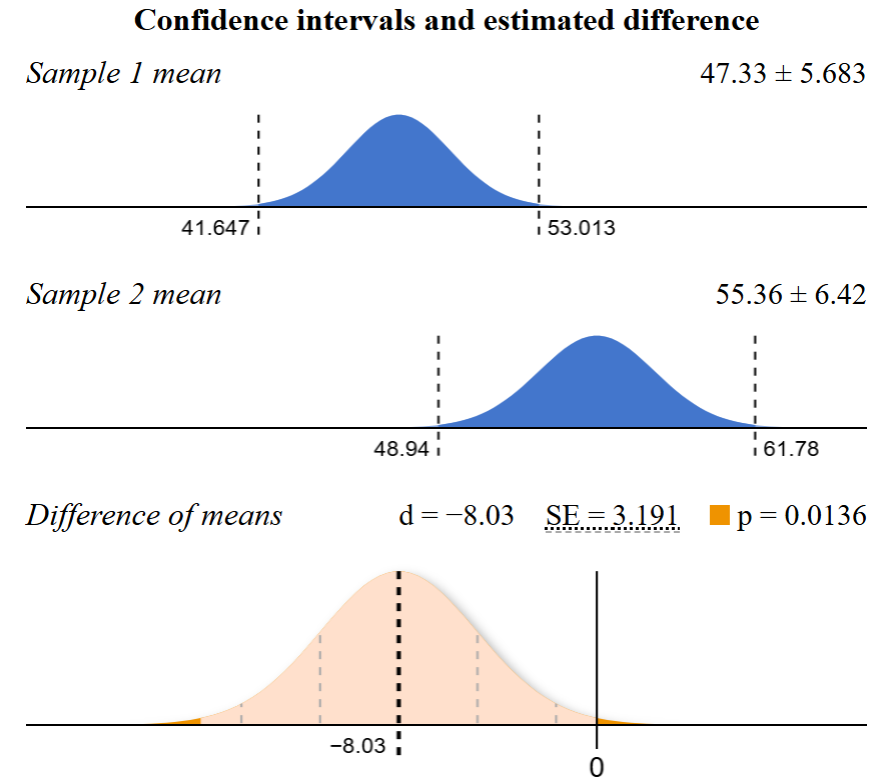


Findings: Promotion 2 vs. Promotion 3

Promotion 3 outperforms Promotion 2 by +\\$8.03K/week ($p = 0.0136$; not significant at $\alpha=0.01$)

KEY STATS:

- **Mean lift:** +\\$8.03 K
- **95% CI:** [−\\$1.00 K, +\\$17.06 K]
- **p-value:** 0.0136 (> 0.01 , not significant)



Recommendations and Next Steps

Recommendations:

- Scale Promotion 1 nationally to capture the +\\$10.8 K/week lift.
- Pilot Promotion 3 in secondary markets if Promotion 1 resources are limited.
- Reassess Promotion 2—redesign offering or discontinue based on ROI.

Next Steps:

- Perform root-cause analysis of Promotion 1's success (customer segments, channels).
- Evaluate operational capacity and cost implications for rolling out Promotions 1 & 3.
- Design a follow-up test to optimize Promotion 2 (creative, timing, discount level).