

## Predicting Catalog Demand

Whether or not to roll out catalogues to 250 customers and if the company does so, will it return an acceptable profit.

Predicted Sales in order to forecast expected revenue and profit

### Analysis, Modeling, and Validation

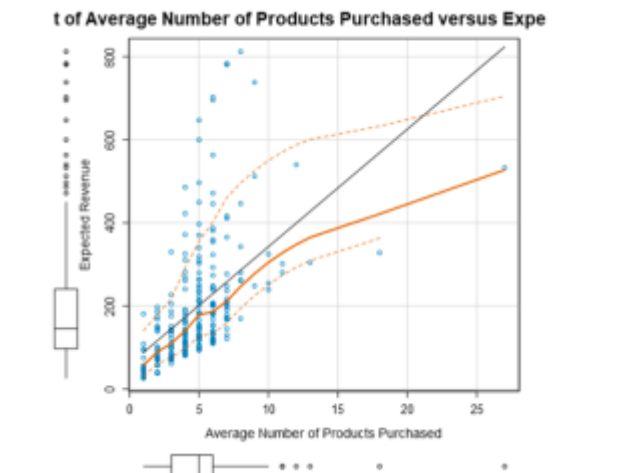
Provide a description of how you set up your linear regression model, what variables you used and why, and the results of the model. Visualizations are encouraged. (500 word limit)

**Important: Use the p1-customers.xlsx to train your linear model.**

At the minimum, answer these questions:

1. How and why did you select the [predictor variables \(see supplementary text\)](#) in your model? You must explain how your continuous predictor variables you've chosen have a linear relationship with the target variable. Please refer to this [lesson](#) to help you explore your data and use scatterplots to search for linear relationships. You must include scatterplots in your answer.
- For the regression:  
(Predicted) Target Variable: Predicted Sales then it is used to calculate Expected Revenue and Profit  
Coefficient Variables:
    - Customer Segment: this is important because their membership level (Loyalty etc..) can reflect if they are a frequent shopper at the store.
    - Average Products Purchased: Again, this is their buying behaviour

Scatter plots:



- Explain why you believe your linear model is a good model. You must justify your reasoning using the statistical results that your regression model created. For each variable you selected, please justify how each variable is a good fit for your model by using the p-values and R-squared values that your model produced.
- Statistics Value:

Coefficients:				
	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	303.46	10.576	28.69	< 2.2e-16 ***
Customer_SegmentLoyalty Club Only	-149.36	8.973	-16.65	< 2.2e-16 ***
Customer_SegmentLoyalty Club and Credit Card	281.84	11.910	23.66	< 2.2e-16 ***
Customer_SegmentStore Mailing List	-245.42	9.768	-25.13	< 2.2e-16 ***
Avg_Num_Products_Purchased	66.98	1.515	44.21	< 2.2e-16 ***

Significance codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 137.48 on 2370 degrees of freedom  
 Multiple R-squared: 0.8369, Adjusted R-Squared: 0.8366  
 F-statistic: 3040 on 4 and 2370 DF, p-value: < 2.2e-16

P values of Subcategory of Customer segments and average products purchased are all  $\leq 0.05$ , this shows that these coefficients are statistically significant.

And the Adjusted R-squared is relatively high, at 0.8368.

This makes the predictive model quite reliable.

- What is the best linear regression equation based on the available data? Each coefficient should have no more than 2 digits after the decimal (ex: 1.28)

Predicted Sales =  $313.76 - 149.36(\text{if type: Consumer segment: Loyalty Club}) + 281.84 (\text{If type: Consumer Segment: Loyalty Club and Credit Card}) - 245.42(\text{If type: Consumer Segment: Store Mailing list}) + 66.98 (\text{Average Number of Products Purchased})$

## Presentation/Visualization

Use your model results to provide a recommendation. (500 word limit)

At the minimum, answer these questions:

- What is your recommendation? Should the company send the catalog to these 250 customers?
  - It depends on the company's goal but if it does send out those catalogues, it would be expecting to earn an extra revenue of 47,224.87 and profit of 21,987.44 in return. This is higher than the 10,000 profit benchmarks that it had set. Moreover, it will also increase its consumer awareness and acquisition through the catalogue distribution.

3. How did you come up with your recommendation? (Please explain your process so reviewers can give you feedback on your process)

- $(\text{Revenue} * 0.50 - \text{Cost}) * \text{Probability of buying}$  is positive

Looking at it from a profit benefit, it is expected to make profit so there is nothing to lose.

Therefore, it should send out the catalogues in order to increase awareness of its products to young consumers and hopefully, increase their engagement and spending on the product.

4. What is the expected profit from the new catalog (assuming the catalog is sent to these 250 customers)?

- It would be expecting to earn an extra revenue of 47,224.87 and profit of 21,987.44 in return