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TEam 73  
Homework #3

Optimizing Product Pricing

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# Introduction

The Book Emporium wants to price books to optimize profits. To help achieve this goal, they have gathered data on the sale of the Harry Potter book 7. Each week, the Book Emporium varied their prices on this book to determine a demand curve. They also gathered information on the percent of customers that visited the website and purchased the Harry Potter 7 book. For this exercise, we are working on the assumption that J.K. Rowling has announced she will write a sequel to the Harry Potter series and we want to determine the optimal price point for the sequel.

## Definitions

The following reflects that the data gathered in the spreadsheet provided for the exercise.

* Price what you will charge each customer who purchases the new book
* Book Cost what you must pay the publisher for each book
* % purchased in your pricing test, the percent of people who bought at that price
* Predicted % your regression model estimate of the percent sold based on price
* Predicted sales estimate of number of customers who buy the book from you
* Revenue total revenue generated (price \* predicted sales)
* Profit (price – book cost) \* predicted sales

## Assumptions

The following assumptions will be used to

1. Assume that the demand for the book sequel will be similar to Harry Potter 7.
2. Assume that 100,000 customers will consider purchasing a book from you
3. The data is not an entirely accurate prediction of the demand, but a regression on the data using a power model will give a reasonable prediction
4. Assume that you pay the publisher $5.00 for each book.

# #1 Regression Analysis

1. Regression analysis (40%) a. Graph the percent purchased against price (5%)

## #1b – Power Regression

b. Perform a regression using power regression to determine the predicted % column

### #1bi – Graphing the Curve

1. Graph the new curve (5%)

### #1bii –Equation of the Line

1. Estimate the equation of the line (5%)

### #1biii – R2 Meaning

1. What does the R2 mean? (5%)

## #1c – Estimation of Number of Books Sold

c. Assuming there are 100,000 customers who visit your website and the publisher cost is $5.00, estimate the number of books sold (predicted sales column) (5%)

## #1d – Calculation of Revenue

d. Calculate the revenue column (price \* predicted sales) (5%)

## #1e – Calculation of Profit

e. Calculate the profit column ((price – book cost) \* predicted sales) (5%)

## #1f – Profit Values for Prices

f. Use conditional formatting to highlight the profit values for all prices (5%)

# #2 – Optimization Analysis

2. Optimization analysis (with constraints) (30%)

## #2a – Price Point for Highest Profit

a. Calculate the price point for the highest profit possible

In the following section, we show the highest profit possible based on the criteria noted.

### #2ai – Publisher Price of $5.00 and no Minimum Order

i. The publisher will sell the books to you at $5.00 each with no minimum order (10%)

### #2aii – Publisher Price of $4.50 and at least 30,000 books

ii. The publisher has agreed to sell you the books at $4.50 each if you sell at least 30,000 (10%)

### #2aiii – Publisher Price of $4.00 and at least 50,000 books

iii. The publisher has agreed to sell you the books at $4.00 each if you sell at least 50,000 (10%)

## #2b – Constrained Optimization

b. Run a constrained optimization for each of the above situations to determine which cost point (from the publisher) and price (to your customer) maximizes your profit. Which cost point should you accept from the publisher?

# #3 - Discussion

3. Discussion (30%)

## #3a - Risks

1. What are the risks of using Harry Potter 7 data in predicting your new demand curve for the Harry Potter sequel? (15%)

## #3b – Additional Data

b. What other data would you like to have to perform your analysis? (15%)

Figure 1: Placeholder for Figure Caption