

HW 3 Group # 5

OPTIMIZED PRODUCT PRICING

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SCM 651: Business Analytics

Background

Definitions

Price

Book Cost

% purchased Predicted % Predicted sales Revenue

Profit

Assumptions

what you will charge each customer who purchases the new book what you must pay the publisher for each book

in your pricing test, the percent of people who bought at that price your regression model estimate of the percent sold based on price estimate of number of customers who buy the book from you

total revenue generated (price * predicted sales) (price – book cost) * predicted sales

Optimizing Product Pricing

The Book Emporium wants to price books to optimize profits. The spreadsheet for this homework has sales data on Harry Potter book 7. For each week, the Book Emporium varied prices on Harry Potter 7 to determine a demand curve. The percent of customers who visited BookEmporium.com and purchased Harry Potter book 7 is shown in the spreadsheet. J.K. Rowling has announced a sequel to the Harry Potter series. Determine the price for the sequel.

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.

Assignment What's due:

Submit an analysis **before the live class in week 8**. Suggested length is five pages, but should not exceed ten pages, single-spaced, 12-point font. Use Excel to analyze the data and document your results in a Word document.

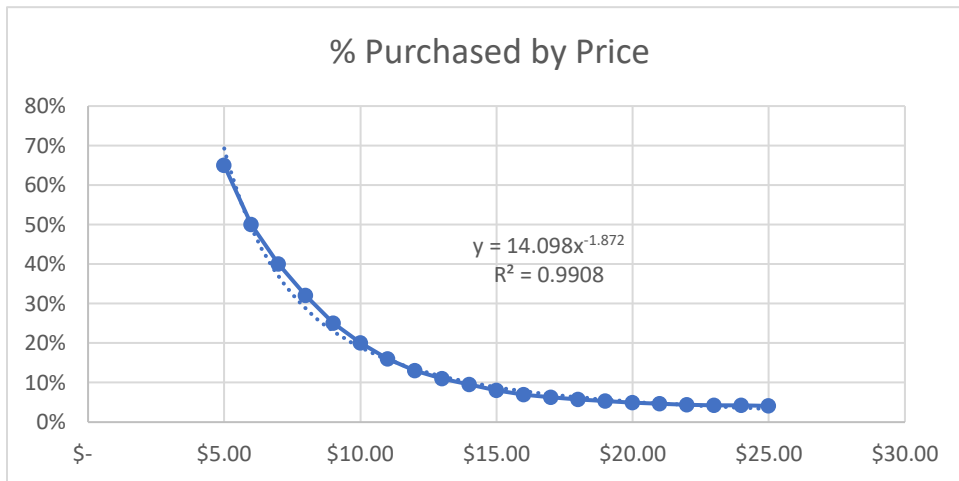
This is a group assignment; each student should upload a copy of the assignment to the Learning Management System. The paper must be a Microsoft Word document. You should also submit the Excel spreadsheet with the regression and optimization analysis. **Submit both your Word and Excel files.** Name the files HW3_Team# where # is your team number. Be sure to include the names of everyone on the team on the first page of the paper. Late assignments will not be accepted. Failure to follow directions will be penalized.

Homework #3 1

SCM 651: Business Analytics

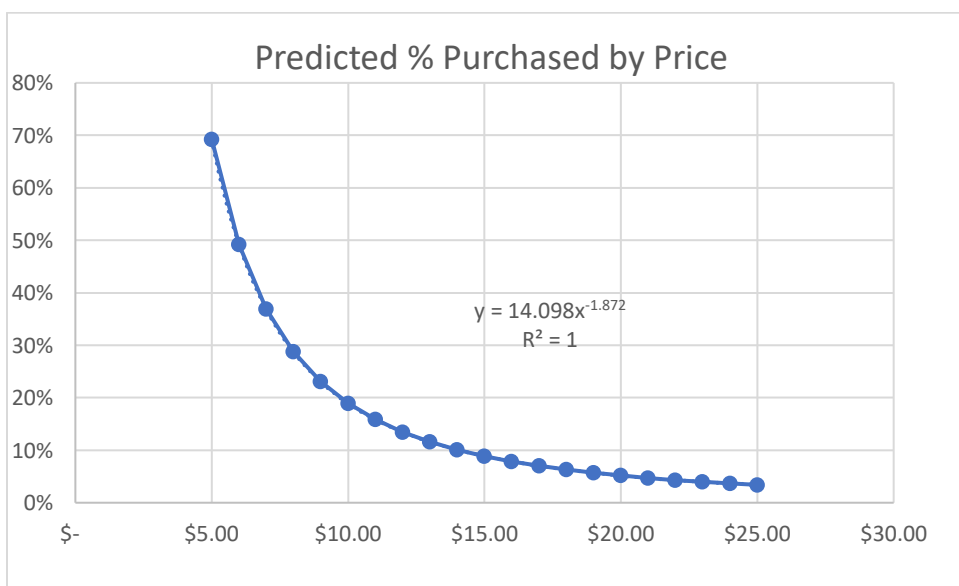
Outline and grading criteria:

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



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

- i. Graph the new curve (5%)



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

% Purchased = Constant * Price ^ power

% Purchased = 14.10 * Price ^-1.87

iii. What does the R^2 mean? (5%)

The RSquared for the first graph (raw data) means that 99.1 % of the variation in % Purchased is explained by the variation in Price. The RSquared for the second graph (predicted data) means that 100% of the variation in % Purchased is explained by the variation in Price. This makes sense, given it is a modeled prediction.

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%)

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

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

Price	% Purchased	Predicted %	Predicted Sales	Revenue	Profit
\$ 5.00	65%	69%	69,280	346,401	-
\$ 6.00	50%	49%	49,246	295,476	49,246.07
\$ 7.00	40%	37%	36,901	258,307	73,802.07
\$ 8.00	32%	29%	28,739	229,911	86,216.69
\$ 9.00	25%	23%	23,052	207,467	92,207.43
\$ 10.00	20%	19%	18,925	189,253	94,626.32
\$ 11.00	16%	16%	15,832	174,157	94,995.00
\$ 12.00	13%	13%	13,453	161,431	94,167.80
\$ 13.00	11%	12%	11,580	150,546	92,643.56
\$ 14.00	10%	10%	10,080	141,124	90,722.26
\$ 15.00	8%	9%	8,859	132,882	88,588.29
\$ 16.00	7%	8%	7,851	125,610	86,356.61
\$ 17.00	6%	7%	7,008	119,141	84,099.41
\$ 18.00	6%	6%	6,297	113,347	81,861.95
\$ 19.00	5%	6%	5,691	108,127	79,672.26
\$ 20.00	5%	5%	5,170	103,396	77,547.18
\$ 21.00	5%	5%	4,719	99,089	75,496.30
\$ 22.00	4%	4%	4,325	95,149	73,524.35
\$ 23.00	4%	4%	3,980	91,531	71,632.99
\$ 24.00	4%	4%	3,675	88,196	69,821.76
\$ 25.00	4%	3%	3,404	85,111	68,088.95

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

Price	Profit
\$ 5.00	\$ -
\$ 6.00	\$ 49,246.07
\$ 7.00	\$ 73,802.07
\$ 8.00	\$ 86,216.69
\$ 9.00	\$ 92,207.43
\$ 10.00	\$ 94,626.32
\$ 11.00	\$ 94,995.00
\$ 12.00	\$ 94,167.80
\$ 13.00	\$ 92,643.56
\$ 14.00	\$ 90,722.26
\$ 15.00	\$ 88,588.29
\$ 16.00	\$ 86,356.61
\$ 17.00	\$ 84,099.41
\$ 18.00	\$ 81,861.95
\$ 19.00	\$ 79,672.26
\$ 20.00	\$ 77,547.18
\$ 21.00	\$ 75,496.30
\$ 22.00	\$ 73,524.35
\$ 23.00	\$ 71,632.99
\$ 24.00	\$ 69,821.76
\$ 25.00	\$ 68,088.95

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

1. Calculate the price point for the highest profit possible

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

price	\$ 10.73
demand	16,578
unit cost	\$ 5.00
fixed cost	\$ -
revenue	\$ 177,928.66
variable cost	\$ 82,887.88
profit	\$ 95,040.78

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

Scenario 2	
price	\$ 7.82
demand	30,000
unit cost	\$ 4.50
fixed cost	\$ -
revenue	\$ 234,557.01
variable cost	\$ 134,999.81
profit	\$ 99,557.20

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

Scenario 3	
price	\$ 5.95
demand	50,000
unit cost	\$ 4.00
fixed cost	\$ -
revenue	\$ 297,575.16
variable cost	\$ 199,999.96
profit	\$ 97,575.20

2. 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?

To maximize profit, the best combination would be at the 4.50 cost point with a price of 7.82. This would maximize the profit between the three scenarios, with a profit of 99,557.20.

Which cost point should you accept from the publisher depends on what the goal of is for writing the book. If the goal is to simply maximize profit, then the second scenario is the best. However, if the goal is to maximize users while still maintaining a good profit, the 3rd scenario is the best. Perhaps there is another scenario where the price is even lower with a maximized profit to obtain the highest number of books sold. Without knowing the motivation of the writer, it is impossible to definitively say which cost point they should accept.

3. Discussion (30%)

- A. What are the risks of using Harry Potter 7 data in predicting your new demand curve for the Harry Potter sequel? (15%)
 - i. How has sales trended overall for the first 7 books?
 - ii. As the user base has aged, has it influenced the books?

- iii. Are there any movies that precede this version of the book?
- iv. How has the rate of inflation risen or fallen?
 - v. What was the price elasticity of previous releases?
 - vi. How sensitive are users to price change?
- B. What other data would you like to have to perform your analysis? (15%)
 - i. Historical versions time series
 - ii. Demographics of user base
 - iii. Seasonality data on book sales
 - iv. What data can we get about sales of books, with corresponding movies.
I.e. do book sales go up if they precede or follow the movie release.
 - v. Price elasticity of targeted demographics.
 - vi. Which marketing campaigns are most effective for book releases? What worked previously? What didn't work?