

# Optimizing Product Pricing

*Homework 3*

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Team 71

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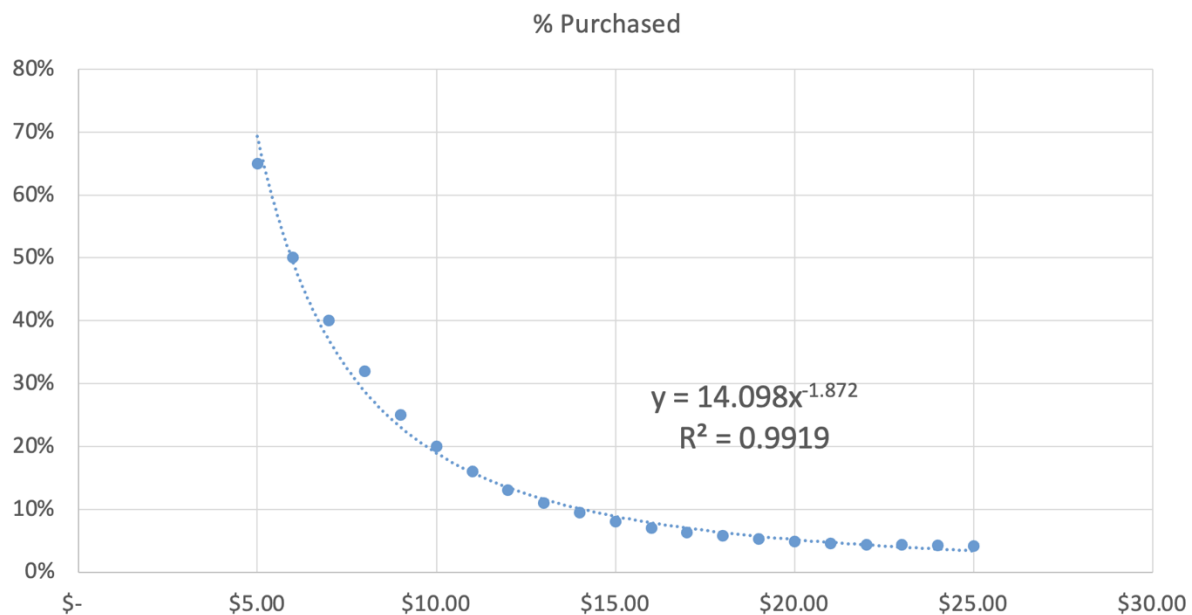
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## Regression analysis

- a. Graph the percent purchased against price
- b. Perform a regression using power regression to determine the predicted % column.
  - i. Graph the new curve
  - ii. Estimate the equation of the line
  - iii. What does the R<sup>2</sup> mean?

The R<sup>2</sup> means that 99.19% of the change in the demand can be explained by the change in the price.



- 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)
- d. Calculate the revenue column (price \* predicted sales)
- e. Calculate the profit column ((price – book cost) \* predicted sales)
- f. Use conditional formatting to highlight the profit values for all prices

Price	% Purchased	Predicted %	Predicted Sales	Revenue	Profit
\$ 5.00	65%	69%	69,292	\$ 346,462	\$ -
\$ 6.00	50%	49%	49,256	\$ 295,535	\$ 49,256
\$ 7.00	40%	37%	36,909	\$ 258,364	\$ 73,818
\$ 8.00	32%	29%	28,746	\$ 229,966	\$ 86,237
\$ 9.00	25%	23%	23,058	\$ 207,519	\$ 92,231
\$ 10.00	20%	19%	18,930	\$ 189,303	\$ 94,652
\$ 11.00	16%	16%	15,837	\$ 174,206	\$ 95,021
\$ 12.00	13%	13%	13,456	\$ 161,477	\$ 94,195
\$ 13.00	11%	12%	11,584	\$ 150,591	\$ 92,671
\$ 14.00	10%	10%	10,083	\$ 141,167	\$ 90,750
\$ 15.00	8%	9%	8,862	\$ 132,925	\$ 88,617
\$ 16.00	7%	8%	7,853	\$ 125,651	\$ 86,385
\$ 17.00	6%	7%	7,011	\$ 119,181	\$ 84,128
\$ 18.00	6%	6%	6,299	\$ 113,386	\$ 81,890
\$ 19.00	5%	6%	5,693	\$ 108,164	\$ 79,700
\$ 20.00	5%	5%	5,172	\$ 103,433	\$ 77,575
\$ 21.00	5%	5%	4,720	\$ 99,125	\$ 75,524
\$ 22.00	4%	4%	4,327	\$ 95,184	\$ 73,551
\$ 23.00	4%	4%	3,981	\$ 91,565	\$ 71,660
\$ 24.00	4%	4%	3,676	\$ 88,229	\$ 69,848
\$ 25.00	4%	3%	3,406	\$ 85,144	\$ 68,115

## 2. Optimization analysis (with constraints)

Question	Answer
a. Calculate the price point for the highest profit possible	-
i. The publisher will sell the books to you at \$5.00 each with no minimum order	\$10.73
ii. The publisher has agreed to sell you the books at \$4.50 each if you sell at least 30,000	\$7.82
iii. The publisher has agreed to sell you the books at \$4.00 each if you sell at least 50,000	\$5.95
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?	Cost: \$4.50 Price: \$7.82

<i>The publisher will sell the books to you at \$5.00 each with no minimum order (10%)</i>				
Price	Cost	Predicted %	Predicted Sales	Profit
\$10.73	\$5.00	17%	16,580	\$95,067

<i>The publisher has agreed to sell you the books at \$4.50 each if you sell at least 30,000 (10%)</i>				
Price	Cost	Predicted %	Predicted Sales	Profit
\$7.82	\$4.50	30%	30,000	\$99,587

<i>The publisher has agreed to sell you the books at \$4.00 each if you sell at least 50,000 (10%)</i>				
Price	Cost	Predicted %	Predicted Sales	Profit
\$5.95	\$4.00	50%	50,000	\$97,607

### 3. Discussion

Question	Answer
a. What are the risks of using Harry Potter 7 data in predicting your new demand curve for the Harry Potter sequel?	<ul style="list-style-type: none"><li>• If Harry Potter 7 came out over a decade ago this does not adjust for inflation. We might be selling books at too low of a cost.</li><li>• Also, Harry Potter had momentum from each previous book. Each book building on the suspense of the other. Book 7 closed out the series. Book 8 would be restarting the series and therefore isn't a buildup of demand from the previous book.</li><li>• Since the last book came out in 2007, Universal Studios constructed themed areas directly related to Harry Potter in five of their parks, three additional movies hit theaters, and an entire spin-off world related to Harry Potter released in books and movie forms as the series <i>Fantastic Beasts</i>. This continuous push fostered new generations to pick up the series, potentially boosting demand.</li><li>• Another risk to using the previous book data in the release relates to the uncertainty of where the book would pick up in the series. Since there was a fourteen-year break from the release of the last book, J.K. Rowling could take the series in an entirely different route that could change the number of fans willing to purchase the book.</li><li>• Another risk is that the market for physical books has changed. Since 2007, tablets and Kindles were introduced into the market, which changed how consumers access literature. This could greatly impact the demand. In addition, the cost to produce a book will be different.</li><li>• In direct competition with the physical book market, online retail exploded from 2007 to 2021 causing many book retailers to close shop throughout the last decade. This could greatly impact the demand of the Harry Potter book for this specific retailer.</li></ul>
b. What other data would you like to have to perform your analysis?	<ul style="list-style-type: none"><li>• We would like an inflation adjustment percentage. This would aid in understanding the new prices.</li><li>• Demand and price will be different all over the country. Having geographic data might be helpful in building a better model.</li><li>• We would like to understand all of the Direct Costs not just the publisher costs. So the shipping costs to get to the retailers.</li><li>• The trend in ticket sales for Harry Potter world in Universal Studios theme parks could influence analysis by indicating continued demand for purchasing Harry Potter books. This could indicate whether the number of fans has changed over the last fourteen years.</li><li>• Additional data that would be helpful includes international sales data in terms of price for books as areas outside the United States purchases over double the number of books.</li></ul>