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| **Background**  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* book 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.  **Assumptions**   1. Assume that the demand for the book sequel will be similar to *Harry Potter* book 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. |
| **Question 1: Regression analysis (35%)**   1. **Graph the percent purchased against price. (5%)**      1. **Perform a regression using power regression to determine the predicted % column.**      1. **Estimate the equation of the line. (5%)**   *y = 14.098x-1.872*   1. **What does the R2 mean? (5%)**   *An R2 of .9919 means that 99% of the change in the dependent variable % Purchases can be explained by the independent variable Book Sale Price.*  **For the following 4 questions please refer to the table following question f.**   1. **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%)** 2. **Calculate the revenue column (price \* predicted sales). (5%)** 3. **Calculate the profit column ((price – book cost) \* predicted sales). (5%)** 4. **Use conditional formatting to highlight the profit values for all prices. (5%)** |
| **Question 2: Optimization analysis (with constraints) (35%)**   1. **Calculate the price point for the highest profit possible.** 2. **The publisher will sell the books to you at $5.00 each with no minimum order. (10%)**  |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Price** | **Cost** | **Pred %** | **Pred Sales** | **Profit** | | $ 10.74 | $5.00 | 16.55% | 16,555 | $95,070 |  1. **The publisher has agreed to sell you the books at $4.50 each if you sell at least 30,000. (10%)**  |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Price** | **Cost** | **Pred %** | **Pred Sales** | **Profit** | | $ 7.82 | $4.50 | 30.0% | 30,000 | $99,587 |  1. **The publisher has agreed to sell you the books at $4.00 each if you sell at least 50,000. (10%)**  |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Price** | **Cost** | **Pred %** | **Pred Sales** | **Profit** | | $ 5.95 | $4.00 | 50.0% | 50,000 | $97,607 |  1. **Which solution results in the highest profit? What price do you charge customers? What cost do you pay the publisher? (5%)**   *Scenario 2 returns the highest profit of $99,587. The sale price of each book is $7.82 with a book cost of $4.50.* |
| **Question 3: Discussion (30%)**   1. **What are the risks of using *Harry Potter* book 7 data in predicting your new demand curve for the *Harry Potter* sequel? (15%)**   The largest risk is assuming the demand for the sequel will be similar to the demand for Harry Potter book 7. Because book 7 was released almost 12 years ago, the demand landscape could be vastly different today than it was then. Furthermore, it would be beneficial to know how the demand for book 7 compared to books 1 through 6. This additional context would paint a better picture of how book demand trended across all the Harry Potter books. If demand increased with each book release, this would make us more confident in using book 7’s demand curve as a conservative base case. However, if book 7 performed poorly, we may be hesitant to rely too strongly on book 7’s demand curve. On its own, the demand curve alone does convey enough information about what can be expected for future book sales.  As a corollary, too heavy a reliance on our current demand curve and we could end up hurting ourselves by trying to price our book too perfectly. The price discount optimizations in the questions above resulted in the best outcome right on the lower bounds for books needed to sell to get the discounted publisher price. For example, to pay the $4.50 cost we must price the book such that exactly 30,000 books are sold. If we’re wrong and we sell 1 less book than that, then our entire profit model is ruined. So, it would make sense to price our book more conservatively to allow for more cushion from optimized results.  Additionally, there is the risk that we have chosen the wrong format for our release. A further investigation of the demand for hard copy books and e-versions like Kindle would provide the context needed to determine how to maximize profits across formats. The electronic platform would require its own price analysis as these versions tend to be priced cheaper than the hard copy versions.   1. **What other data would you like to have to perform your analysis? (15%)**   A thorough review of various bits of data could help inform our model so that we are making the best choice possible when pricing our book for release.  As such, we would like to examine the reading landscape in terms of reading demand over time and format preference. Are people reading as much as they were when the last Harry Potter book was released? Are people buying hard copies of books at the same rate they were in 2010? Answering these questions will provide a more balanced picture of the market and help shape our approach to the release of the sequel.  Additionally, now that social media is bigger than ever, we are interested in seeing if there’s anything to be learned about J.K. Rowling’s online presence and influence. Are people still tweeting at her about another book and does she still have as strong a following as she once had?  Other bits of data that would be worthwhile include:   * + Book and movie release dates compared to demand.   + Sales over time for Bloomsbury Publishing.   + Sales over time for Fantasy Fiction, Adventure Fiction, and Contemporary Fiction genres.   + Sales over time for J.K. Rowling’s other books.   + Marketing dollars spent for J.K Rowling’s books.  Also, how have her other releases done? Is there pent-up demand for another Harry Potter book? Did book 7 leave room for a continuation of the story?   + A rating for the J.K. Rowling’s visibility. This would include how J.K. Rowling interacts with and is mentioned in news articles, blogs, and social media.   + A rating for the sequel’s visibility. This would include how the sequel is mentioned in early reviews, news articles, blogs, and social media. |