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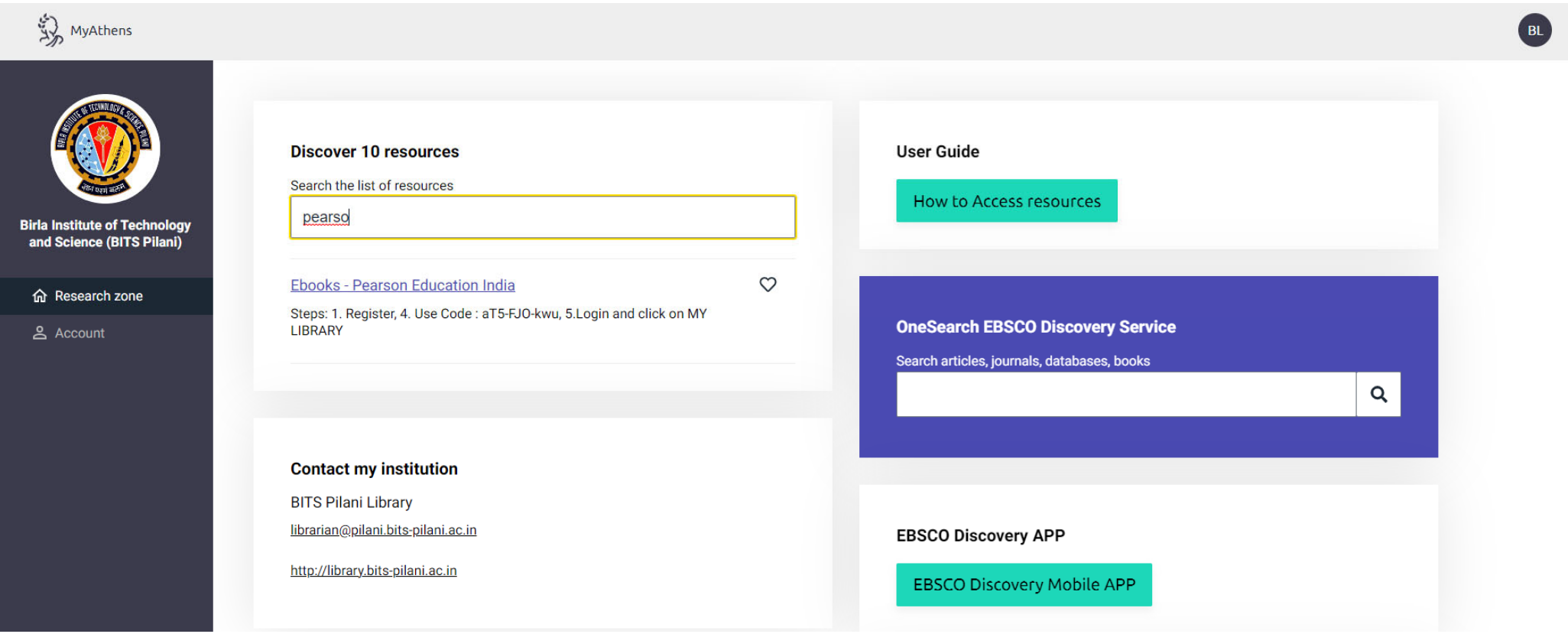

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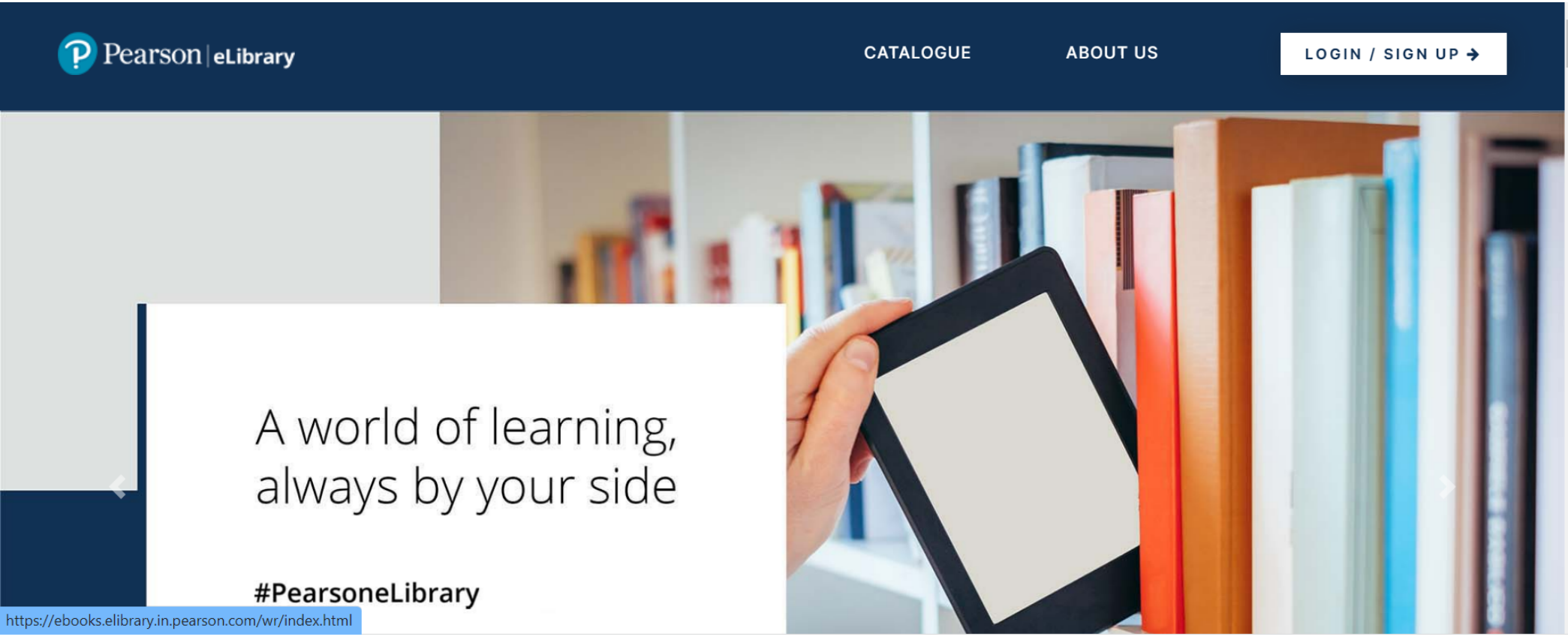

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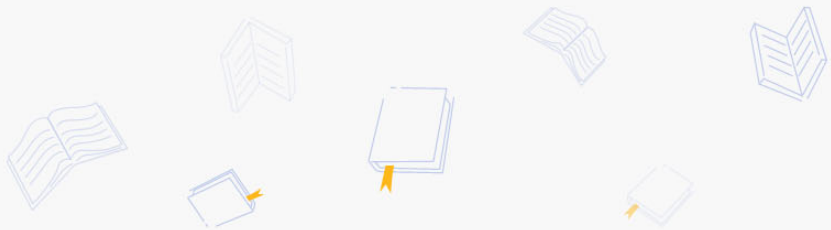

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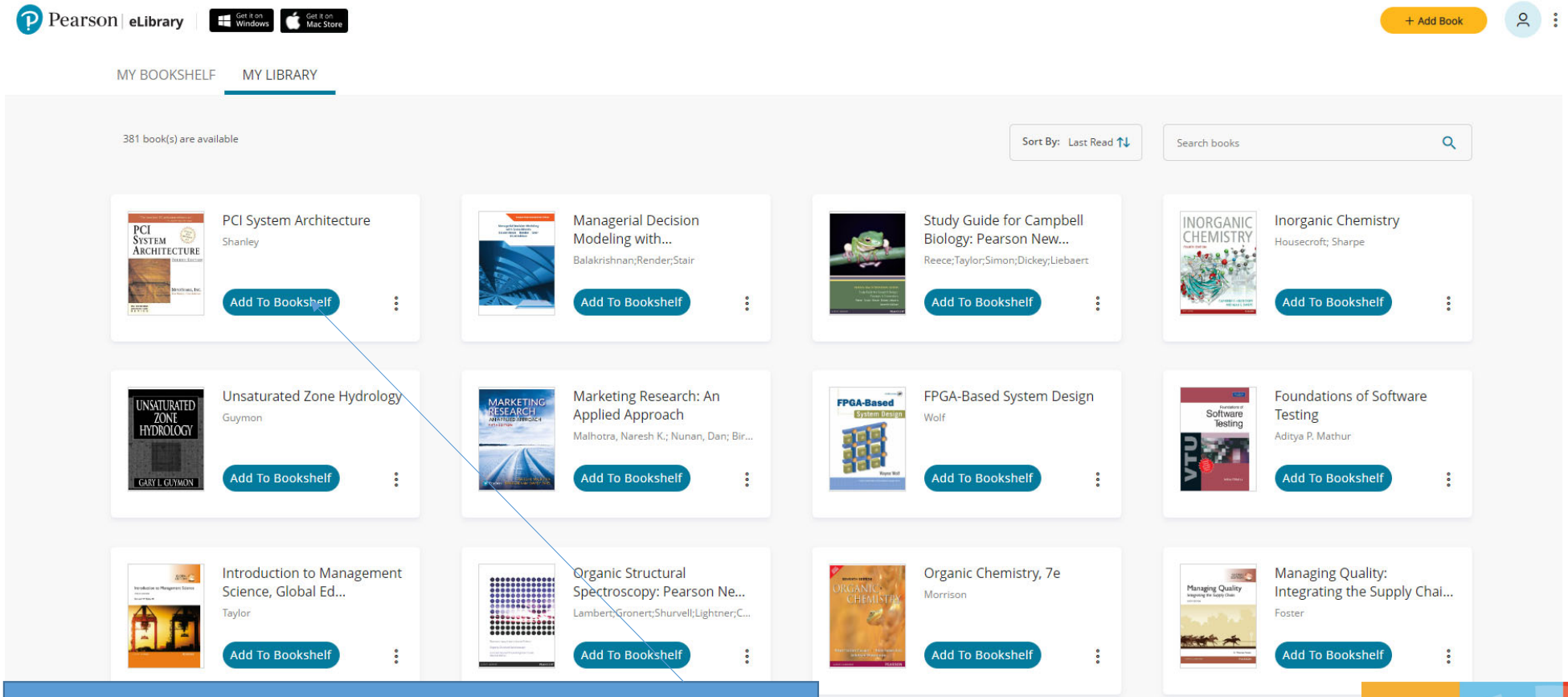

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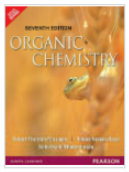

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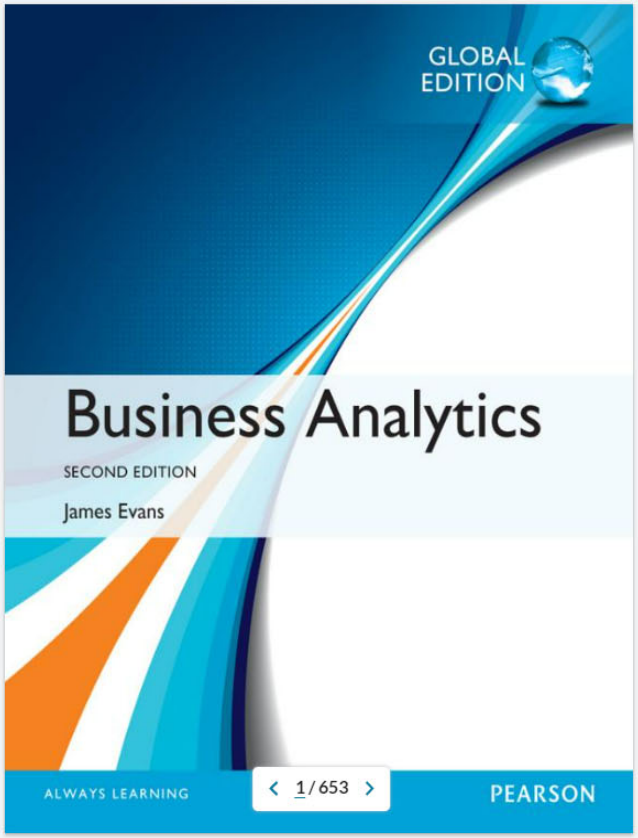

Seating Zone	Seats Available	Ticket Price	Mean Demand	Standard Deviation
Third Level End Zone	21,000	$70.00	17,000	2,500
Third Level End Zone	14,000	$60.00	8,000	3,000

determine the distribution of total revenue under these assumptions using an Excel data table with 50 simulated trials. Summarize your results with a histogram.

4. For the new product model in Problem 9 of Chapter 11, suppose that the first-year sales volume is normally distributed with a mean of 100,000 units and a standard deviation of 10,000. Use the NORM.INV function and a one-way data table to conduct a Monte Carlo simulation to find the distribution of the net present value profit over the 3-year period.

5. Financial analysts often use the following model to characterize changes in stock prices:

$$P_t = P_0 e^{(\mu - 0.5\sigma^2)t + \sigma Z\sqrt{t}}$$

where

P_0 = current stock price
P_t = price at time t
μ = mean (logarithmic) change of the stock price per unit time
σ = (logarithmic) standard deviation of price change
Z = standard normal random variable

This model assumes that the logarithm of a stock's price is a normally distributed random variable (see the discussion of the lognormal distribution and note that the first term of the exponent is the mean of the lognormal distribution). Using historical data, we can estimate values for μ and σ. Suppose that the average daily change for a stock is $0.003227, and the standard deviation is 0.026154. Develop a spreadsheet to simulate the price of the stock over the next 30 days if the current price is $53. Use the Excel function NORM.S.INV(RAND()) to generate values for Z. Construct a chart showing the movement in the stock price.

6. Use *Analytic Solver Platform* to simulate the *Outsourcing Decision Model* under the assumptions that the production volume will be triangular with a minimum of 800, maximum of 1,700, and most likely value of 1,400, and that the unit supplier cost is normally distributed with a mean of $175 and a standard deviation of $12. Find the probability that outsourcing will result in the best decision.

7. For the *Outsourcing Decision Model*, suppose that the demand volume is lognormally distributed with a mean of 1,500 and standard deviation of 500. What is the distribution of the cost differences between manufacturing in-house and purchasing? What decision would you recommend? Define both the cost difference and decision as output cells. Because output cells in *Analytic Solver Platform* must be numeric, replace the formula in cell B20 with =IF(B19<=0,1,0), that is, 1 represents manufacturing and 0 represents outsourcing.

8. Suppose that several variables in the model for the economic value of a customer in Example 11.1 in Chapter 11 are uncertain. Specifically, assume that the revenue per purchase is normal with a mean of $50 and standard deviation of $5 and the defection rate is uniform between 20% and 40%. Find the distribution of V using *Analytic Solver Platform*.

9. For the profit model developed in Example 11.2 in Chapter 11 and the Excel model in Figure 11.4, suppose that the demand is triangular with a minimum of 35,000, maximum of 60,000 and most likely value of 50,000; fixed costs are normal with a mean of $400,000 and a standard deviation of $25,000; and unit costs are triangular with a minimum of $22.00, most likely value of $24.00, and maximum value of $30.00.
   a. Use *Analytic Solver Platform* to find the distribution of profit.
   b. What is the mean profit that can be expected?
   c. How much profit can be expected with probability of at least 0.7?
   d. Find a 95% confidence interval for a 5,000-trial simulation.
   e. Interpret the sensitivity chart.

10. For the *Moore Pharmaceuticals* model, suppose that analysts have made the following assumptions:
   - R&D costs: Triangular($500, $700, $800) in millions of dollars
   - Clinical trials costs: Triangular($135, $150, $160) in millions of dollars
   - Market size: Normal(2000000, 250000)
   - Market share in year 1: Uniform(6%, 10%)

   All other data are considered constant. Develop and run a Monte Carlo simulation model to predict the net present value and cumulative net profit for each