The Economics of Lemonade Stand

Ron Baker: Millersville Univ
Sandra McPherson: Millersville Univ
Hooda Math Lemonade Stand

Play Lemonade Stand on HoodaMath
Easy: Sunny Days only

Medium: Sunny Days and Cloudy Days
– 50% reduction in QD on Cloudy Days

Hard: Sunny, Cloudy, and Rainy Days
– demand drops to zero on Rainy Days
WEATHER REPORT
TODAY'S FORECAST: CLOUDY

DAY: 1
Price arrows can be sensitive.
Hooda Lemonade Stand

Day: 1
Cups Sold: 9
Pitchers: 3

Your Money: $11.00
Game continues for 10 days.
Graphing Demand

Problems: QD never drops to zero (best to give $0-$2 price range)
Demand not quite linear

Nice example of ceteris paribus.
When plotting demand, important to not run out of lemonade!
Tell students to not be concerned about maximizing profits.

Before you pick prices, I want you to think about the direction of the relationship between how many lemonades you sell and the price. If your price increases, will you sell more or less lemonade?

Also, think about how weather impacts sales. The two weather occurrences are sunny days and cloudy days. In other words, do you expect to sell more lemonade during cloudy days compared to sunny days? Or, do you expect to sell more lemonade in sunny days?

Now, use the arrows to increase or decrease the number of pitchers you purchase as well as the price of a cup of lemonade. Use the below table to track your sales:

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Now that we have our data, we want to graph it. Create demand curves on the graph of the back of the page. Remember which variables go on the axes and you also need to take into account the weather (the ceteris paribus var).
Calculating Price Elasticity of Demand using Midpoint Formula

Easy follow-up activity once students plot points for the demand curve.
Choosing optimal price to maximize profits

NEED TO PROVIDE $0-$2 RANGE DUE TO DEMAND PROBLEM.

1) “Plug and Chug” method

- works well for Principles students
- can provide full demand schedule to save time
- calculate TR, TC, and profits
- MR = MC rule tough due to nonlinear demand
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Choosing optimal price to maximize profits cont.

2) Profit equation

- works well for Intermediate students
- uses a linear estimate of demand found by point-slope formula
- uses TC = MC*q
- can use calculus to take derivative of profit equation or use MR = MC
$$m = \frac{1.5 - 5}{10 - 30} = -\frac{1}{20} = -0.05 \text{ *calculating slope of demand}$$

$$P = 0.5 = -0.05(Q - 30) \text{ * using point-slope formula to get inverse demand equation}$$

$$P = 2 - 0.05Q$$

$$\Pi = (2 - 0.05Q)Q - 0.29Q \text{ * maximizing profits to solve for optimal price}$$

$$\frac{d\pi}{dQ} = 2 - 0.1Q - 0.29 = 0$$

$$Q = 17.1 \quad P = 2 - 0.05(17.1) = $1.145 = $1.15$$
Cool Math Lemonade Stand

—more complex than Hooda Math game (purchase ingredients and choose recipe)
—more detailed weather conditions (temp and weather)
—customer satisfaction and popularity measurements

Cool Math Lemonade Stand game
Inventory/Purchasing

You have:
- 0 Paper Cups
- 0 Lemons
- 0 Cups of Sugar
- 0 Ice Cubes

Buy More Cups
Buy More Lemons
Buy More Sugar
Buy More Ice

Bankrupt! OK Help!

Day: 1
High Temperature: 87 degrees
Money: $30.00
Weather Forecast: Clear and Sunny

Price/Quality Control

Price per Cup: 25 + Cents
Lemons per Pitcher: 4 + Lemons
Sugar per Pitcher: 4 + Cubes
Ice per Cup: 4 + Cubes

Back to Store!

Day: 1 of 7
Money: $17.87
Temperature: 90°F / 32°C
Weather: Cloudy

End of Day Reports

You managed to sell 38 cups to 103 potential customers. Considering the weather, I'd say this is Good.

Your Customer Satisfaction:

72%

Your Popularity:

3%

OK
Using regression to estimate demand

– works well for statistics/econometrics students
– can have students gather their own data outside of class or provide them with a dataset.
– guess the impact of the variables on quantity sold (price, temp, weather, lemons, ice, sugar, popularity, satisfaction)
– could also tie in tests of classical assumptions
– advanced topic: censored observations (occurs when sell out of lemonade during the day)
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Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
QR code for copy of working paper (worksheets in appendix) and data set:

Contact: ronald.baker@millersville.edu