Name: _____ Period: _____ Date: _____

From Candy Auction to Maximum Revenue

Finding the Sweet Spot: Price Optimization Through Data

Part 1: Reviewing Our Auction Data

Yesterday, we conducted a candy auction where each group could buy as many candies as they wanted at each price point. Let's organize what we discovered about **demand** – how many candies people wanted to buy at different prices.

Step 1: Record Your Auction Results

Fill in the table below with the data from our 5 auction rounds:

Round	Price ($)	Total Quantity Demanded
		(candies bought by all groups)
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____
5	_____	_____

Step 2: Quick Check on Demand

Question: Look at your Price vs. Quantity Demanded data. What pattern do you notice?

_____

_____

This pattern is called the **Law of Demand** in economics!

Part 2: From Demand to Revenue

Now comes the business insight: It's not just about how many we sell – it's about how much money we make!

Step 3: Calculate Revenue

For each round, calculate the **revenue** (total money collected):

Revenue = Price × Quantity Demanded

Round	Price ($)	Quantity Demanded	Revenue ($)
	(copy from above)	*(copy from above)*	*(calculate: Price × Quantity)*
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____
5	_____	_____	_____

Step 4: The Million Dollar Question

Looking at your revenue column, which price gave you the **highest revenue**?

Price: $_____ Revenue at that price: $_____

Part 3: Creating the Revenue Graph in Desmos

Step 5: Plot Price vs. Revenue

a) Open Desmos graphing calculator

b) Create a new table with two columns:

- Column 1: Label it x_1 (this is Price)
- Column 2: Label it y_1 (this is Revenue)

c) Enter your 5 data points from the Price and Revenue columns above

d) You should see dots forming a curve!

Sketch what you see:

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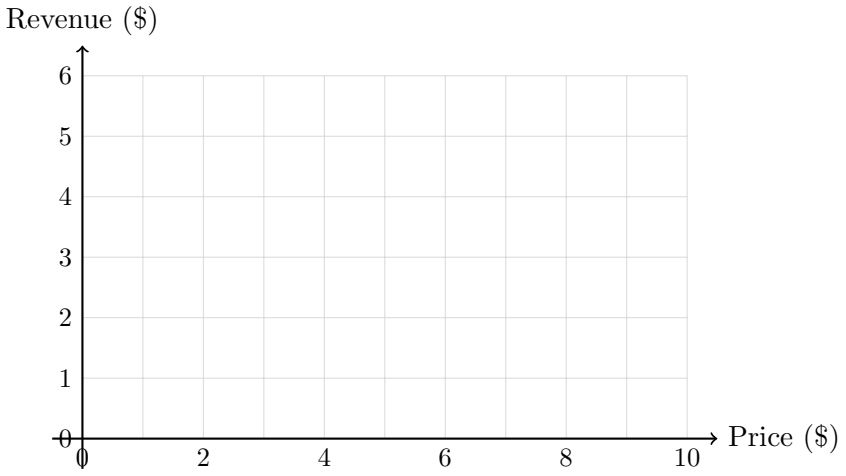

Part 4: Finding the Perfect Price with Regression

Step 6: Fit a Quadratic (Parabola) to Your Data

In Desmos, type this in a new line:

$$y_1 \sim ax_1^2 + bx_1 + c$$

Desmos will automatically find the best-fitting parabola! Write the equation it gives you:

$$\boxed{R(p) = \_\_\_\_\_ p^2 + \_\_\_\_\_ p + \_\_\_\_\_}$$

Record the values Desmos calculated:

- $a =$ _____ (this should be negative because our parabola opens down and has a maximum)
- $b =$ _____
- $c =$ _____

Part 5: The Vertex – Your Optimal Price!

The highest point on your revenue parabola is called the **vertex**. This tells you the best price to charge!

Step 7: Find the Vertex Graphically

a) Click on the highest point of your parabola in Desmos

b) Desmos will show you the coordinates: (Price, Revenue)

Vertex from Graph: Price = $_____ Maximum Revenue = $_____

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Step 8: Find the Vertex Using Algebra

For any parabola $y = ax^2 + bx + c$, the x-coordinate of the vertex is:

$$x = -\frac{b}{2a}$$

Using your values of a and b from Step 6:

$$\text{Optimal Price} = -\frac{b}{2a}$$

$$= -\frac{\_\_\_\_\_}{2 \times (\_\_\_\_\_)}$$

$$= -\frac{\_\_\_\_\_}{\_\_\_\_\_}$$

$$= \$\_\_\_\_\_$$

Check: Does this match what you found graphically? Yes No

Part 6: Making Business Sense

Step 9: Interpret Your Results

Complete these sentences based on your analysis:

a) If we price the candy too low (like \$_____), we sell a lot but don't make much per candy, so our total revenue is _____.

b) If we price the candy too high (like \$_____), we make a lot per candy but _____, so our total revenue is also low.

c) The "sweet spot" price that maximizes our revenue is \$_____, which would give us a revenue of \$_____.

Step 10: Business Recommendation

Write a 2-3 sentence recommendation to a candy store owner based on your analysis:

_____

_____

_____

_____

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Extension Question (if time allows)

Think About It: We found the price that maximizes *revenue*, but businesses care about *profit*. What additional information would we need to find the price that maximizes profit instead?

_____

_____

Next Class: We'll apply these same techniques to help real local businesses (Golden Monkey, Mandee's, and Yas Chicken) find their optimal prices!