Name: _____

MATH 108
Spring 2022
HW 2: Due 02/14

"Whatcha got there? Numbers?"
–Bender Bending Rodriguez, Futurama

Problem 1. (10pt) Tyrell sells mattresses in a store which he rents for $7500 per month with building costs of approximately $635 per month. He purchases these mattresses from a distributor at an average cost of $127 per mattress. On average, each mattress sells for $547.

(a) What are Tyrell's fixed costs?

(b) Find $C(m)$, the cost function associated to selling m mattresses.

(c) Find $R(m)$, the revenue function function for selling m mattresses.

(d) Without finding $P(m)$, the profit function, find the minimum number of mattresses Tyrell needs to sell each month to make a profit.

Problem 2. (10pt) Cheesy Does It is a cheese shop which sells a large variety of cheeses. Suppose they order gouda cheese from a local distributor at a rate of $5.83 per pound (lb). They are charged a delivery fee of $87.25 per order. To make a profit selling this cheese, they markup their purchased price by 60%.

(a) Find $C(\ell)$, the costs associated with selling ℓ pounds of gouda cheese.

(b) Find $R(\ell)$, the revenue associated with selling ℓ pounds of gouda cheese.

(c) Find $P(\ell)$, the profit associated with selling ℓ pounds of gouda cheese.

(d) Using $P(\ell)$, find the minimum number of pounds of gouda cheese the store must sell to turn a profit on these cheese sales.

Problem 3. (10pt) Suppose you have profit and cost functions given by $R(x) = 95.55x$ and $C(x) = 24.35x + 11450$, respectively.

(a) How much does each item sell for? Explain how you know.

(b) What are the fixed costs? Explain how you know.

(c) Find the revenue and costs associated to selling 120 items. Is the seller making a profit?

(d) Sketch $R(x)$, $C(x)$, and $P(x)$ (the profit function) on the same graph—being sure to include the equilibrium point.

Problem 4. (10pt) Suppose the barbershop Jack the Clipper has a revenue function and cost functions $R(x) = 0.04x^2 + 23x - 15$ and $C(x) = 5.2x + 3100$, respectively, where x is the number of haircuts given.

(a) Find the average revenue, cost, and profit for giving 160 haircuts.

(b) Find the marginal revenue, cost, and profit for giving 160 haircuts.

Problem 5. (10pt) Spruce Springclean is a cleaning company which offers a basic and deluxe package. The revenue function for b basic cleanings and d deluxe cleanings is $R(b, d) = 45.99b + 69.99d$, while the associated cost function is $C(b, d) = 5.45b + 8.11d + 7.5$.

(a) How much does a basic and deluxe cleaning cost? Explain how you know.

(b) Find the fixed costs.

(c) Find the costs, revenue, and profit for performing 34 basic cleanings and 29 deluxe cleanings.