Name: _____
MATH 108
Spring 2024
HW 2: Due 01/29

"All wish to possess knowledge, but few, comparatively speaking, are willing to pay the price."

— Decimus Junius Juvenalis

Problem 1. (10pts) Suppose that the revenue and cost function for a certain item are given by $R(q) = 67.99q$ and $C(q) = 13.47q + 495000$, respectively.

(a) How much does the company sell each item for? How much does it cost to make each item?

(b) What are the fixed costs for the production of this good?

(c) What is the profit or loss if the company produces and sells ten-thousand of these items?

(d) What is the break-even point? At least many items does this company need to sell in order to make a profit on this item?

Problem 2. (10pts) Leslie owns a wine and spirit store called *Planet of the Grapes*. She rents the building for $24,730 per month. The average bottle of wine or spirit at her store sells for $11.56. The average cost of ordering, stocking, and selling these wines/spirits is $5.21 per bottle.

(a) What are the fixed and variable costs for Leslie's business?

(b) Find the cost function for Leslie's business.

(c) Find the revenue function for Leslie's business.

(d) Find the break-even point for Leslie's business.

(e) What is the minimal average amount of bottles Leslie must sell per month to make a profit?

(f) How many bottles must Leslie sell each month on average to make a profit of $15,000 (translating to a yearly profit of $180,000)? Does this seem feasible?

Problem 3. (10pts) Suppose a company produces two items, q_1 and q_2, and has a cost function given by $C(q_1, q_2) = 7.23q_1 + 82.56q_2 + 15721.12$.

(a) What are the fixed costs for producing these two items?

(b) What is the total cost associated with producing 30 of the first item and 65 of the second item?

(c) How much does it cost to produce the first item? How much does it cost to produce the second item?

Problem 4. (10pts) Suppose that you have a revenue function given by $R(q) = 89q$ and a cost function given by $C(q) = 45q + 7200$.

(a) What are the revenue and cost at a production/sale level of 60 units?

(b) Without finding the profit function, find the break-even point for the production/sale of this item.

(c) Find the profit function, $P(q)$.

(d) Compute $P(60)$. Explain how you could use (a) to find $P(60)$.