

Name: \_\_\_\_\_

MATH 108

Fall 2023

HW 2: Due 09/12

*"You only have to do a few things right  
in your life so long as you don't do too  
many things wrong."*

*– Warren Buffett*

**Problem 1.** (10pt) Suppose that the revenue and cost function for a certain item are given by  $R(q) = 45.99q$  and  $C(q) = 11.13q + 576000$ , 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.** (10pt) Howard just started a small business cleaning service called *Grossbusters*. For now, he is renting a truck for \$1,550 per month. On average, he charges \$110 per cleaning and uses approximately \$4.86 in supplies per cleaning.

- (a) What are the fixed and variable costs for Howard's cleaning service?
- (b) Find the cost function for Howard's business.
- (c) Find the revenue function for Howard's business.
- (d) Find the break-even point for Howard's business. What is the minimal amount of cleanings Howard must book per month to make a profit?
- (e) How many cleanings must Howard book each month to make a monthly profit of \$8,000 (translating to a yearly profit of \$96,000)? Does this seem feasible?

**Problem 3.** (10pt) Suppose a company produces two items,  $q_1$  and  $q_2$ , and has a cost function given by  $C(q_1, q_2) = 56.20q_1 + 19.45q_2 + 7192$ .

- (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.** (10pt) Suppose that you have a revenue function given by  $R(q) = 120q$  and a cost function given by  $C(q) = 70q + 1600$ .

- (a) What are the revenue and cost at a production/sale level of 80 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  $P(80)$ . Explain how you could use (a) to find  $P(80)$ .