

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it and do only what is asked. Each problem is worth around 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. [6 points] A small manufacturer has revenue function $R(x) = -x^2 + 50x + 116$ and cost function $C(x) = 4x + 20$, where x is the number of items produced and sold.

- (a) Find the break-even points of the operation.

- (b) Find how many items need to be produced and sold to maximize the manufacturer's profit.

2. [3 points] Find the domain of $f(x) = \frac{x^2 - 4}{x^5 - 10x^4 + 21x^3}$.

3. [3 points] Sketch the graph of the piece-wise defined function

$$f(x) = \begin{cases} -x^2 + 5, & \text{if } x < 2 \\ -x + 5, & \text{if } x \geq 2 \end{cases}$$

Please, make a neat graph and label all points of interest.