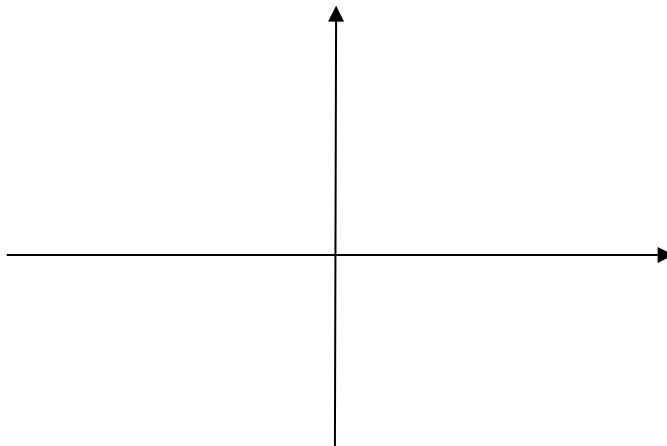**SHOW ALL YOUR WORK. NO CREDITS FOR ANSWERS NOT SUPPORTED BY WORK.**

(1) (20 Points) Consider the function $f(x) = \dfrac{x^2 + 1}{x}$

1. Find all asymptotes of $f(x)$.

2. Find the critical numbers.

3. Find increasing and decreasing intervals

4. Find local extrema if any exists.

5. Find inflection points if any exist.

6. Concavity intervals.

7. Sketch the graph and clearly indicate the features above.

(2) (20 points) A rectangular box (with a top) is to have volume 288 in.^{3}, and its base is to be exactly three times as long as it is wide. What is the minimum possible surface area of such a box? Verify that your answer gives global minimum.