

In Problems 1–3, your answer should include the following points:

1. The domain of the function
2. y -intercept if any, x -intercepts when they are easy to compute
3. Horizontal asymptotes
4. Vertical asymptotes
5. Analysis of the first derivative (intervals where the function is increasing or decreasing, local minima or maxima)
6. Analysis of the second derivative (intervals where the function is concave up or concave down, points of inflection)

Finally, sketch the function. Your drawing does not need to be to scale, but should show all the qualitative features of the graph.

Problem 1

(6 points)

Sketch the graph of the function

$$f(x) = \frac{x^2}{4-x^2}$$

Problem 2

(6 points)

Sketch the graph of the function

$$f(x) = -\ln(x) + \sqrt{x}$$

Problem 3

(6 points)

Sketch the graph of the function

$$f(x) = 2e^{-4/x}$$

Problem 4

(6 points)

A family wants to build a fenced-in area in their garden for their rabbits. Two sides of the rectangular fencing will be given by a hedge. The family bought 50 m of fencing. What area is the optimum for the rectangle such that the rabbits have the largest possible area in which to graze?

Problem 5

(6 points)

Find the radius of the circle which minimizes *the square of the distance* of the circle centered at the origin to the points $(1, 0)$ and $(-1, 1)$.