Math 1a. §2.5. Limits Involving Infinity
Worksheet

Fall 2005

1. Graph

\[ y = \frac{2x^3 - 16}{x^3 - 27}, \]

after calculating the limits as \( x \to 3 \) and \( x \to \pm\infty \). What are the vertical and horizontal asymptotes.

2. Let \( t \) be the time in weeks. At time \( t = 0 \), organic waste is dumped into a pond. The oxygen level in the pond at time \( t \) is given by

\[ f(t) = \frac{t^2 - t + 1}{t^2 + 1}. \]

Assume that \( f(0) = 1 \) is the normal level of oxygen.

(a) Sketch the graph of this function.
(b) Describe the shape of the graph. What is the significance of the minimum for the pond?
(c) What eventually happens to the oxygen level of the pond?
   
   Approximately how many weeks must pass before the oxygen level returns to 75% of its normal level?
3. Find possible equations to match the following graphs.

4. Explain what happens to the rational function

\[ h(x) = \frac{x^2 + 1}{x} \]

as \( x \to \pm\infty \).