Lesson 2 Practice Problems

Limits & Infinity MATH 2200-98

Evaluating Limits Involving Infinity

For Problems 1 to 4 use algebraic/analytic methods to find the limit (if it exists). If the limit does not exist, explain why.

1. Find $\lim_{x\to\infty} \sqrt{9x^2+x} - 3x$ or show it does not exist (DNE).

2. Evaluate $\lim_{x\to\infty} \dfrac{3x^2 - x + 4}{2x^2 + 5x - 8}$. Justify each step with property used.

3. $\lim_{x\to\infty} \dfrac{\sin^2 x}{x^2+1}$

4. $\lim_{x\to -4} \dfrac{\frac{1}{4} + \frac{1}{x}}{4+x}$

5. $\lim_{x\to-\infty} \dfrac{\sqrt{9x^6 - x}}{x^3+1}$

Horizontal & Vertical Asymptotes

6. Consider $f(x) = \dfrac{2x^2 - x - 1}{x^2 + x - 2}$. Using your knowledge of limits determine the following.
   (a) The vertical asymptotes or holes of $f(x)$.

   (b) The horizontal asymptotes of $f(x)$.