Math 1000 – Dalhousie University – Summer 2010

Assignment 7 – Due Wednesday July 28

1. Let $f(x) = x^4 + 2x^3 - 12x^2$.

   (a) Find the hypercritical numbers of f.

   (b) Determine the intervals of upward and downward concavity.

   (c) Find the points of inflection.

2. Let $f(x) = x^5 - 5x + 3$.

   (a) Find the critical numbers of f.

   (b) Use the second-derivative test to determine what kind of extremum f has at its critical numbers.

3. Given $f(x) = x^4 - 18x^2$, find intervals of increase / decrease, relative extrema, intervals of concavity, and point(s) of inflection. Use this information to sketch the graph. [Note: some of the critical / hypercritical numbers will involve radicals (square roots). That's okay!]

4. Evaluate the following limits.

   (a) $\lim_{x \to -\infty} \dfrac{3x + 5}{x^2 - 4}$

   (b) $\lim_{x \to \infty} \dfrac{x + 2}{\sqrt{9x^2 + 1}}$

5. Use L'hopital's rule to evaluate the following limits.

   (a) $\lim_{x \to \infty} \dfrac{e^x}{x^3}$

   (b) $\lim_{x \to \infty} x \tan\left(\dfrac{1}{x}\right)$

   (c) $\lim_{x \to \infty} (e^x + x)^{\frac{1}{x}}$