Math 1A Worksheet 3

August 31st, 2007

1. Graph the following functions. Do NOT do so by plotting points.
   i) $\cos(\frac{x}{2\pi})$
   ii) e^{x+1}
   iii) $\sin(\frac{1}{x})$, where $0 < x$.

2. It is a well-documented fact that if Chuck Norris is within k feet of you, you have at most k^2 seconds left to live. A man is (foolishly) standing at $x = 2$ feet on the very same real axis where Chuck Norris is standing. If the man's grisly demise is certain to happen within the next eighth of a second, what are all possible points where can Chuck be standing? Write the answer using:
   i) Inequalities ($\leq$ and $\geq$).
   ii) Absolute value notation and a **single** inequality.
   ii) Interval notation.

3. Consider the function $f(x) = \sin(\frac{1}{x})$ which we graphed in problem 1. Let ϵ be any positive (non-zero!) real number. What values can $f(x)$ have for $0 < x < \epsilon$? Does
   $$\lim_{x \to 0^+} \sin(\frac{1}{x})$$
   exist?

4. Suppose
   $$\lim_{x \to a^+} f(x) \quad \text{and} \quad \lim_{x \to a^-} f(x)$$
   exist. Does $\lim_{x \to a} f(x)$ have to also exist?

5. List all functions f which are both even and odd.

6. Show that any function can be written as the sum of an even function and an odd function.