Worksheet 1, Math 1A
Limits

Monday, September 16, 2013

1. Evaluate the limit if it exists:

   (a) $\lim\limits_{t \to 1} \dfrac{t^4 - 1}{t^3 - 1}$

   (b) $\lim\limits_{t \to 0} \left(\dfrac{1}{t} - \dfrac{1}{t^2 + t} \right)$

   (c) $\lim\limits_{h \to 0} \dfrac{(2 + h)^3 - 8}{h}$

   (d) $\lim\limits_{x \to -4} \dfrac{\sqrt{x^2 + 9} - 5}{x + 4}$

2. Prove that $\lim_{x \to 0^+} \sqrt{x} e^{\sin(\pi/x)} = 0$.

3. Prove that $\lim_{x \to 2}(x^2 - 4x + 5) = 1$ using the ϵ, δ definition of a limit.

4. Use the definition of continuity and the properties of limits to show that the function $f(x) = 2\sqrt{3 - x}$ is continuous on the interval $(-\infty, 3]$.

5. Find a continuous function $g : \mathbb{R} \to \mathbb{R}$ which is equal to $f(x) = (x^2 - x - 2)/(x - 2)$ wherever f is defined.

6. Prove that cosine is a continuous function.