Take-Home Quiz 1

Math 131 Section 22

Due Monday, October 9, 2005

Problem 1. (2 points). Give the official definition of

$$\lim_{x \to c} f(x).$$

Problem 2. (2 points). Define $F : \mathbb{R} \to \mathbb{R}$ by the rule

$$F(x) = (x + 17)^3.$$

and find functions f and g so that $F = f \circ g$.

Problem 3. (2 points). Define a function $f : \mathbb{R} \to \mathbb{R}$ by

$$f(x) = \begin{cases} x & \text{if } x < 0, \\ \sqrt{2} & \text{if } x = 0, \\ x^2 & \text{if } x > 0. \end{cases}$$

What is $\lim_{x \to 0} f(x)$?

Problem 4. (3 points). Evaluate this limit:

$$\lim_{x \to 1} \frac{x^3 - 1}{x - 1}.$$

Problem 5. (3 points). Give an ϵ-δ proof of the fact that

$$\lim_{x \to 1} 3x + 2 = 5.$$