HOMEWORK 1

MATH 19 - WINTER 2005

Do the following exercises from Stewart's *Single Variable Calculus*:

- Section 2.1: 5, 8
- Section 2.2: 1, 2, 5, 9, 10

Also, solve the following problems.

E1. Let $h(x) = e^{x^2+1}$.

a. Find functions $f(x)$ and $g(x)$ such that $(f \circ g)(x) = h(x)$.
b. Compute $(f \circ g)(0)$, $(g \circ f)(0)$, and $h(0)$.
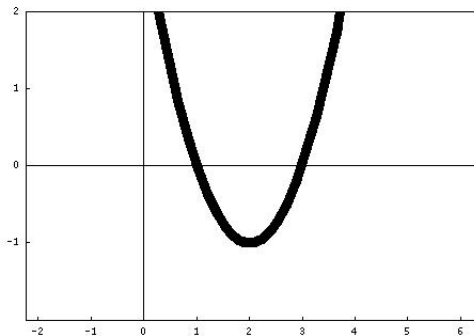c. What function is $(g \circ f)(x)$?

E2. Find functions $f(x), g(x)$, and $h(x)$ with

$$(f \circ g \circ h)(x) = \sqrt{\cos(\sin(x))}.$$

E3. Find functions $f(x), g(x)$, and $h(x)$ with

$$(f \circ g \circ h)(x) = 2^{\sin(\sqrt{x})}.$$

E4. The graph of a function $f(x)$ is shown below.

a. Compute $f^{-1}(-1)$ and $f^{-1}(0)$.
b. Graph $f^{-1}(x)$.
c. Is $f^{-1}(x)$ a function? Justify your claim.

E5. Let

$$f(x) = \begin{cases} \dfrac{x^3 - x^2 + 3x - 3}{x - 1} & , x \neq 1; \\ 4 & , x = 1. \end{cases}$$

a. Simplify the definition of $f(x)$ by factoring. Verify that your simplification agrees at $x = 1$.
b. Use the simplified definition to graph $f(x)$.
c. Use the graph of $f(x)$ to determine $\lim_{x \to 1} f(x)$.