Derivatives

1. If $h = f \circ g$, with f and g differentiable functions, then $h'(2)$ equals

(a) $f'(2) \circ g'(2)$

(b) $f'(2)g'(2)$

(c) $f'(g(2))g'(2)$

(d) $f'(g(x))g'(2)$

2. Compute the derivative:

$$(a) \sqrt{x^3 - 2x + 1} \qquad (b) \frac{\sin^5(-x)}{x + 2} \qquad (c) (-x^2 - e^{e^{e^{\pi}}} + 1)^{10}$$

3. Let

$$f(x) = \begin{cases} e^{-1/x^2} & x \neq 0 \\ 0 & x = 0 \end{cases}$$

(a) Compute $f'(x)$ for $x \neq 0$.

(b) Compute $f'(0)$ (this is hard, you will need to use limits).

4.

(a) Write two functions $f(x)$ and $g(x)$ such that $(f \circ g)'(x) = f'(g(x))$.

(b) Write two functions $f(x)$ and $g(x)$ such that $(f \circ g')(x) = g'(f(x))f'(x)$.