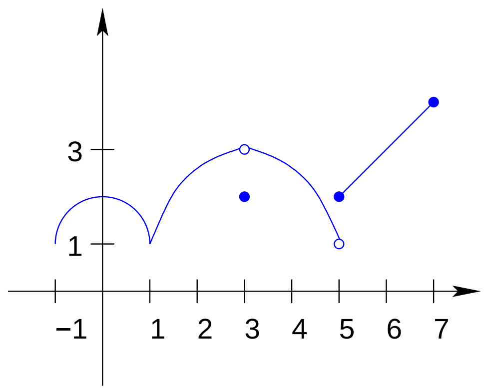
Name: ____________________

Math 1311
Test 1
Fall 2003

1. Consider the function $y = f(x)$, whose graph is sketched in the figure below.



(a) Estimate $f(2)$, $f'(2)$, $f(1)$, and $f'(1)$.

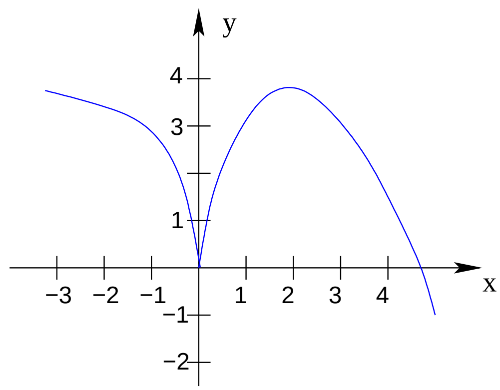
(b) Where on the interval $-1 < a < 7$ does $\lim_{x \to a} f(x)$ fail to exist?

(c) Where on the interval $-1 < x < 7$ does f fail to be continuous?

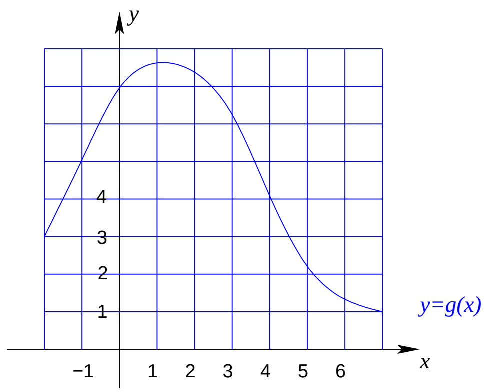
(d) Where on the interval $-1 < x < 7$ does f fail to have a derivative?

(e) Where on the interval $-1 < x < 7$ is $f'(x) = 0$?

2. (a) Draw the graph of $f'(x)$ for the function $f(x)$ whose graph is shown below.



(b) From the figure below, estimate $g'(-1)$, $g'(1)$, $g'(4)$, and $g'(6)$.



3. Find the derivative f' if

   (a) $f(x) = \sqrt{\dfrac{t^2+1}{t^2-1}}$

   (b) $f(t) = 9\sqrt[3]{t^4} - \dfrac{3}{\sqrt[3]{t}}$

4. A cubical block of ice is melting in such a way that each edge decreases steadily by 2 in. every hour. At what rate is its volume decreasing when each edge is 10 in. long?

5. Evaluate the given limit if it exists.

   (a) $\lim_{x\to 0} \frac{\tan x}{\sin 2x}$

   (b) $\lim_{x\to 2^+} \frac{16-x^2}{\sqrt{16-x^2}}$

6. Use the definition of the derivative as a limit to evaluate the slope of the tangent line of the curve $f(x) = x^2 + 1$ at $x = 0$.