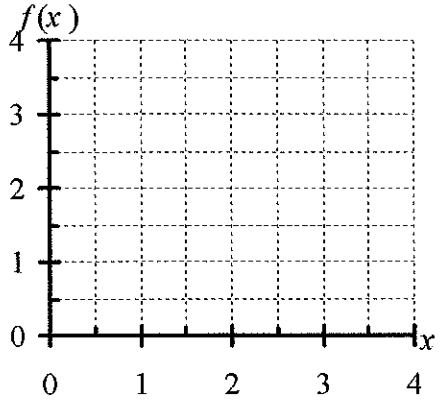
Math 122B-008 Worksheet 5

1. Consider the function $f(x)=\begin{cases} 2x & \text{for } x<2 \\ -(x-2)^2+4 & \text{for } x\geq 2 \end{cases}$

(a) Graph this function as neatly and as accurately as possible.



(b) Find $\lim_{h\to 0^-}\dfrac{f(2+h)-f(2)}{h}$. SHOW ALL WORK.

(c) Find $\lim_{h\to 0^+}\dfrac{f(2+h)-f(2)}{h}$. SHOW ALL WORK.

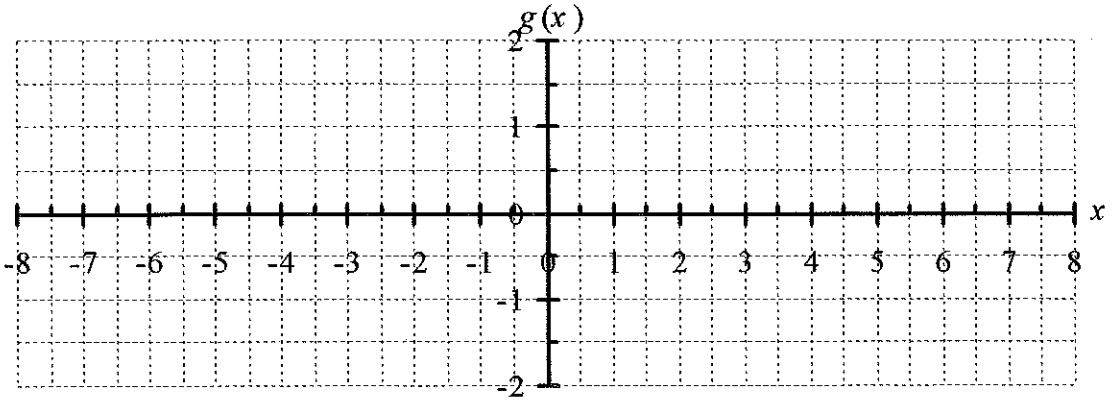
(d) What is the value of $\lim_{h\to 0}\dfrac{f(2+h)-f(2)}{h}$?

(e) What is $\dfrac{d}{dx}(f(2))$? Explain your answer.

(f) Is f continuous at $x=2$?

2. Consider the function $g(x) = x^{1/3}$.

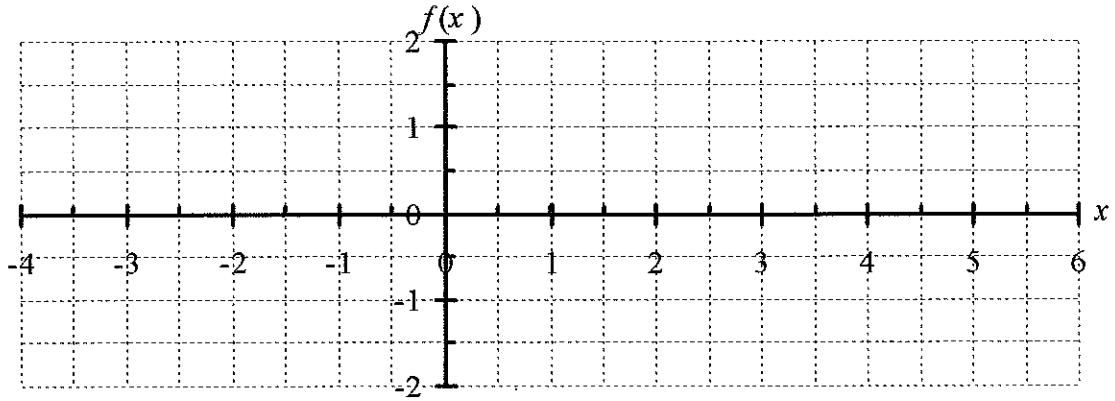
(a) Graph this function as neatly and as accurately as possible.



(b) Use the power rule to find $g'(0)$. SHOW ALL WORK.
Use the graph of $g(x)$ to explain why your answer is as it is.

(c) Is $g(x)$ continuous at $x = 0$?

3. On the grid below, sketch any function that is not continuous at $x = 2$.



Is your function differentiable at $x = 2$? Explain.