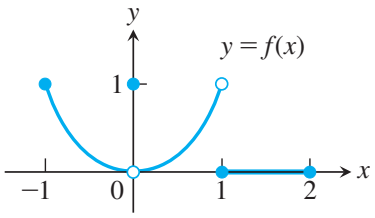
Quiz 2

Name: _____ Section: _____

Answer all 6 questions for a total of 100 points. Write your solutions in the space provided and put a box around your final answers.

1. Use the graph below to find each of the limits. If a limit does not exist, write DNE.



(a) (4 points) $\lim_{x \to -1^+} f(x)$

(b) (4 points) $\lim_{x \to 0^+} f(x)$

(c) (4 points) $\lim_{x \to 0^-} f(x)$

(d) (4 points) $\lim_{x \to 1^+} f(x)$

(e) (4 points) $\lim_{x \to 1^-} f(x)$

(f) (4 points) $\lim_{x \to 0} f(x)$

(g) (4 points) $\lim_{x \to 1} f(x)$

2. Evaluate each of the following limits. If a limit does not exist, write DNE

   (a) (10 points) $\lim_{x \to -2} \dfrac{-2x - 4}{x^3 + 2x^2}$

   (b) (10 points) $\lim_{x \to -1} \dfrac{\sqrt{x^2 + 8} - 3}{x + 1}$

3. There are two equivalent definitions for the derivative of a function $f(x)$ at a point a, denoted $f'(a)$.

$$f'(a) = \lim_{x \to a} \frac{f(x) - f(a)}{x - a} \qquad \text{(Definition 1)}$$

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h} \qquad \text{(Definition 2)}$$

Let $f(x) = \dfrac{x}{2 - x}$.

(a) (10 points) Use Definition 1 to find $f'(4)$.

(b) (6 points) Use your answer to part (a) to give an equation for the line tangent to $y = f(x)$ at the point $(4, -2)$.

4. There are two equivalent definitions for the derivative of a function $f(x)$ at a point a, denoted $f'(a)$.

$$f'(a) = \lim_{x \to a} \frac{f(x) - f(a)}{x - a} \qquad \text{(Definition 1)}$$

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h} \qquad \text{(Definition 2)}$$

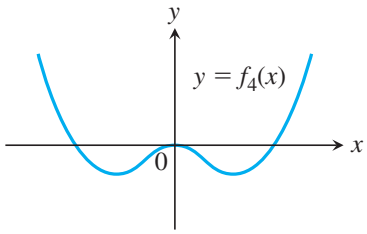
Let $f(x) = 3x^2 - 4x$.

(a) (10 points) Use Definition 2 to find $f'(2)$.

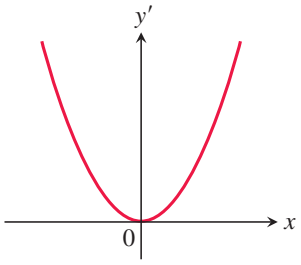
(b) (6 points) Use your answer to part (a) to give an equation for the line tangent to $y = f(x)$ at the point $(2, 4)$.

5. (10 points) Evaluate the limit $\lim_{x \to 0} \dfrac{3}{\sqrt{3x+1}+1}$.

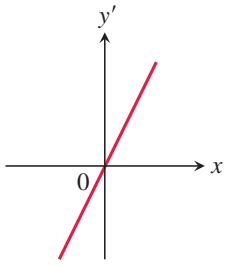
6. (10 points) Consider the graph $y = f(x)$ below.



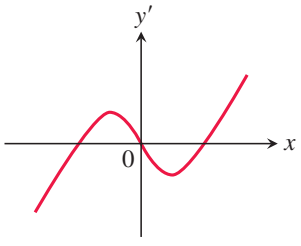
Which one of the following graphs is the graph $y = f'(x)$? Why (briefly)?



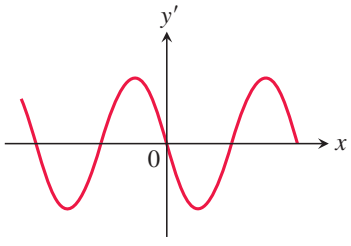
(a)



(b)



(c)



(d)