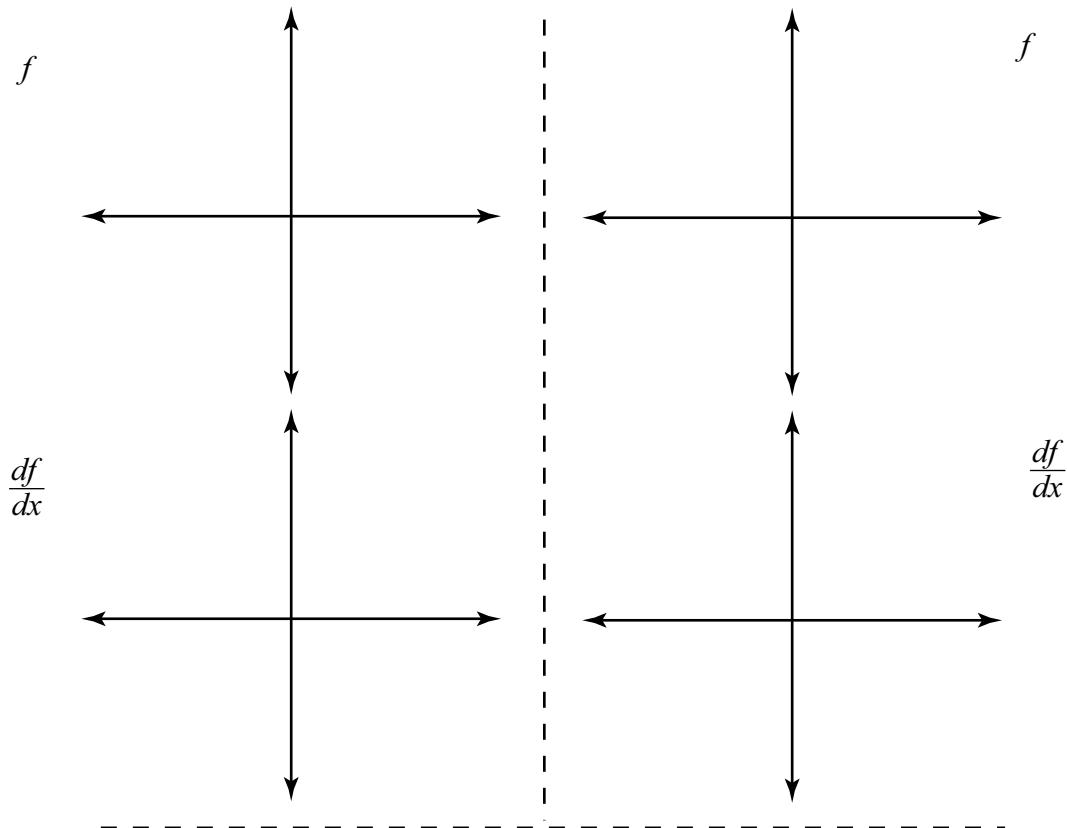


Math 251 Quiz 3A

1. First sketch a graph of the function  $f$ . Next sketch a graph of the derivative  $\frac{df}{dx}$  without actually finding the rule of the derivative.

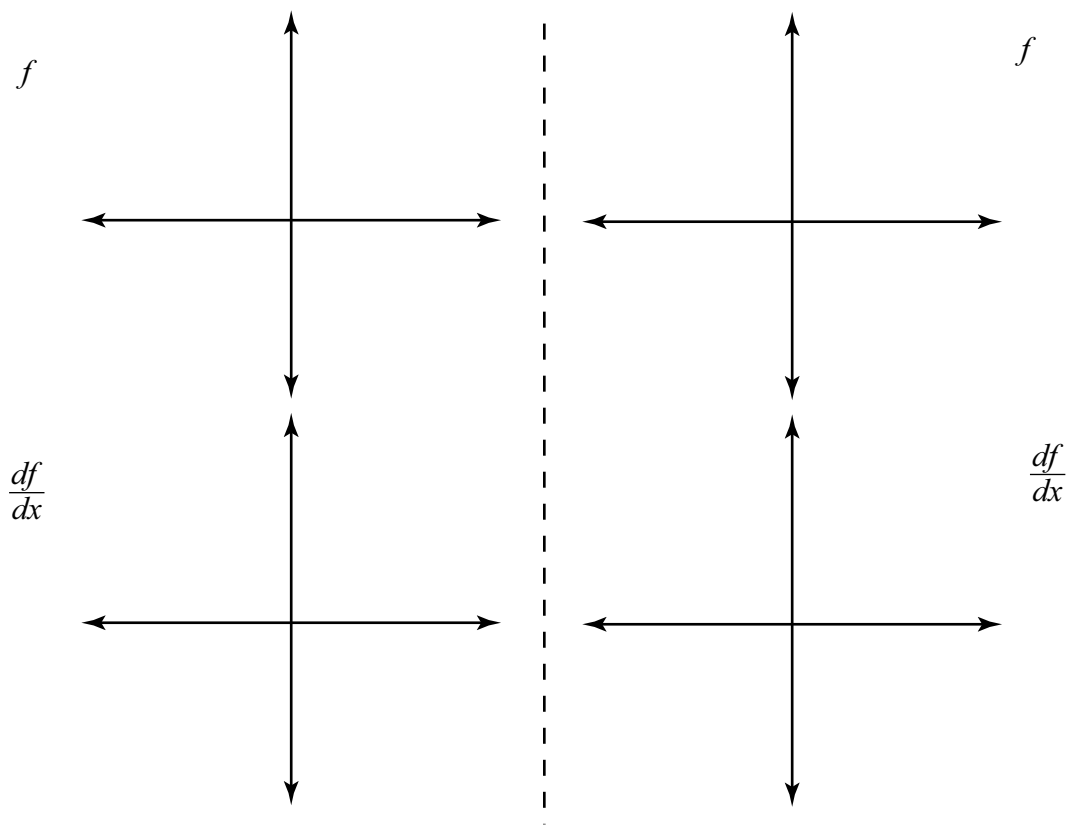
(a)  $f(x) = x^2$

(b)  $f(x) = \frac{1}{x}$



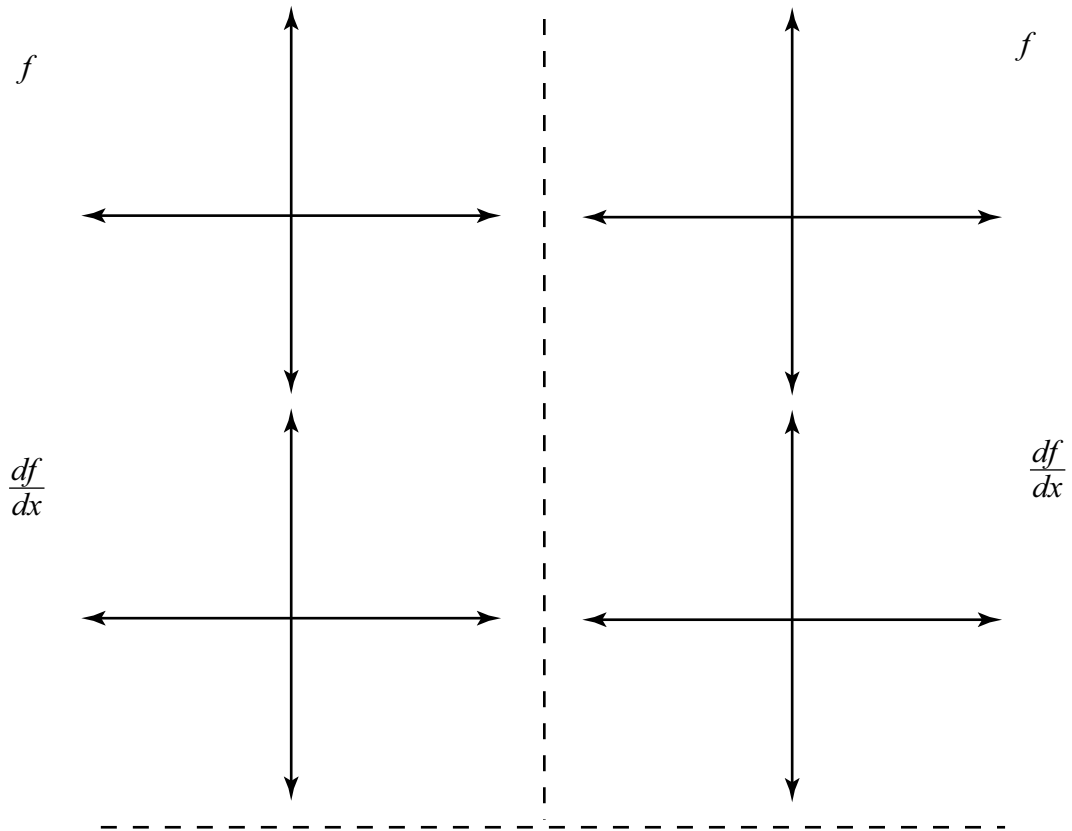
(c)  $f(x) = \sin(x)$

(d)  $f(x) = e^x$



(e)  $f(x) = |x|$

(f)  $f(x) = \tan(x)$



2. (a) Let  $f(x) = x^2$  and compute  $\frac{d}{dx}f(x)$  using the difference quotient. Compare your answer with 1(a).

(b) Let  $f(x) = \frac{1}{x}$  and compute  $\frac{d}{dx}f(x)$  using the difference quotient. Compare your answer with 1(b).

(c) Let  $f(x) = \sin(x)$ . Using your answer for 1(c), make a guess at the rule of  $f'$ .

(d) Let  $f(x) = e^x$ . Using your answer for 1(d), make a guess at the rule of  $f'$ .

3. Let  $y = 3x^2 - 5x + 2$ . Compute  $y'$  and give the equation of the tangent line to the graph of  $y = 3x^2 - 5x + 2$  at the point  $(3, 14)$ .

4. Let  $f(x) = \sqrt[3]{x}$ .

(a) Use the difference quotient to calculate  $f'(0)$ , if it exists.

[Hint:  $h = (\sqrt[3]{h})^3$ .]

(b) Sketch a graph of  $f(x)$  along with the line tangent to  $f$  at the point  $(0, 0)$ .

[Hint: The tangent line will cross through the graph of  $f$ .]

(c) Explain how your answers in parts (a) and (b) are related.