

2.1 Derivative Basics: Quiz D

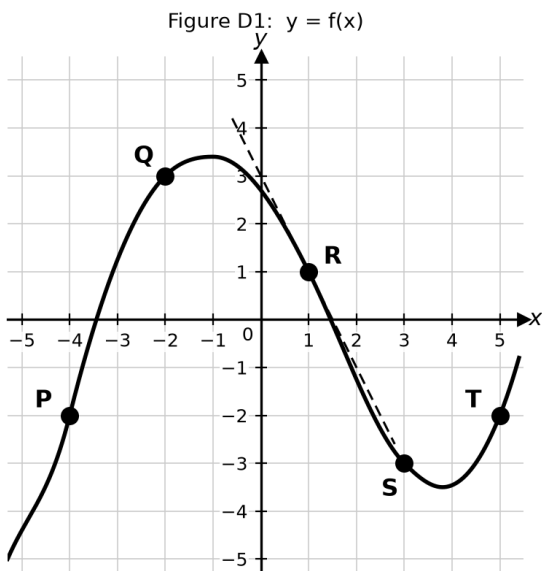
Name: _____

Time: 25 minutes No calculator 40 points

To the extent possible under law, the author(s) have waived all copyright and related or neighboring rights to this practice quiz. CC0 1.0 Universal: <https://creativecommons.org/publicdomain/zero/1.0/>. Prepared with assistance from Claude, an AI model made by Anthropic. **Provided AS IS, without warranty of any kind; use at your own risk.** Not every item has been vetted; problems, answers, and keys may contain errors.

Answer exactly the question asked. Show work on Questions 2, 4, and 5.
If a derivative does not exist, write DNE. If a function value does not exist, write *undefined*.

1. Questions 1(a)–1(e) refer to Figure D1, the graph of f . (2 each, 10 pts)
The labeled points are on the graph; the dashed line is tangent to the graph at R .



- (a) $\lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{h}$ _____
- (b) $\lim_{h \rightarrow 0} [f(1+h) - f(1)]$ _____
- (c) An equation of the tangent line at R _____
- (d) The labeled point at which $f'(x)$ is greatest _____
- (e) Every labeled point at which $f'(x) < 0$ _____

2. Let $f(x) = \frac{1}{x}$. Evaluate $\frac{f(x) - f(2)}{x - 2}$ for $x = 4$. (4 pts)

3. Answer only. (3 each, 6 pts)

- (a) The limit $\lim_{h \rightarrow 0} \frac{(h-2)^3 + 8}{h}$ equals $f'(c)$ for the function $f(x) = x^3$.
Find c . _____

- (b) Evaluate $\lim_{h \rightarrow 0} \frac{(3-h)^2 - 9}{h}$. _____

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

(a) Use the definition below to find $f'(x)$.

(8 pts)

An answer found without the definition earns at most 2 points.

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

(b) Find every point (x, y) on the graph of f at which the tangent line is horizontal.

(4 pts)

5. Let $g(x) = \frac{1}{x^2}$. Use the definition below with $c = -1$ to find $g'(-1)$.

(8 pts)

An answer found without the definition earns at most 2 points.

$$g'(c) = \lim_{x \rightarrow c} \frac{g(x) - g(c)}{x - c}$$