Calculus: Derivatives practice (concepts and graphs)

Name _____ Block _____

Show all work. Mark your final answer. **2 points** are for notation, neatness, organization, and clarity. No trig. No calculator.

1. A function r is differentiable. [4 points]

a. In one sentence, say what the number $r'(-2)$ is. In another sentence, say what the function $r'(x)$ is.

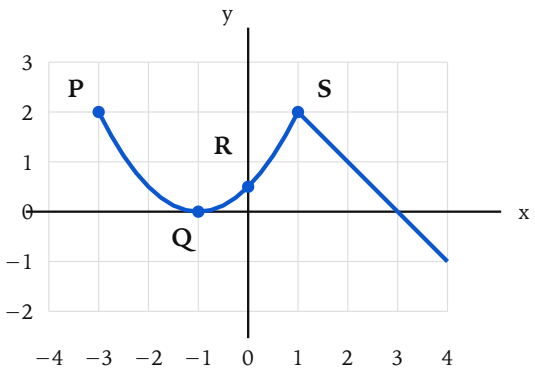
b. Sketch a curve that is falling as it passes $x = -2$, and sketch the tangent line there. Label the point of tangency, and label the slope as $r'(-2)$. Do not sketch the graph of r'.

2. The graph of w is below. The points P, Q, R, and S are marked. [4 points]

a. At which labeled point is the derivative equal to zero?

b. At which labeled point is the derivative not defined? Say why in one sentence.

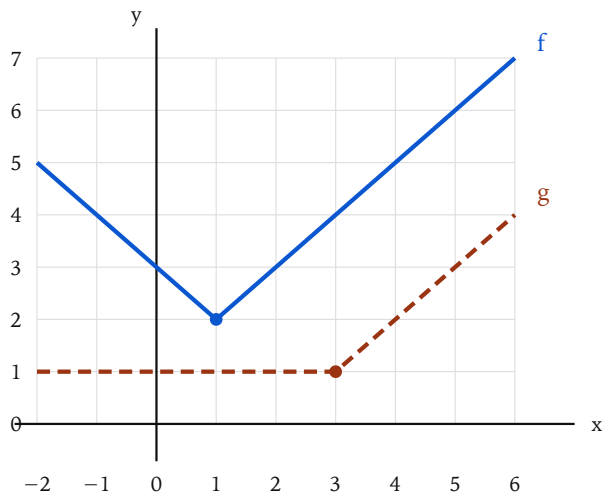
c. At P, is the derivative positive or negative? At R?



3. f is solid. g is dashed. Let $h(x) = f(x) \cdot g(x)$. [3 points]

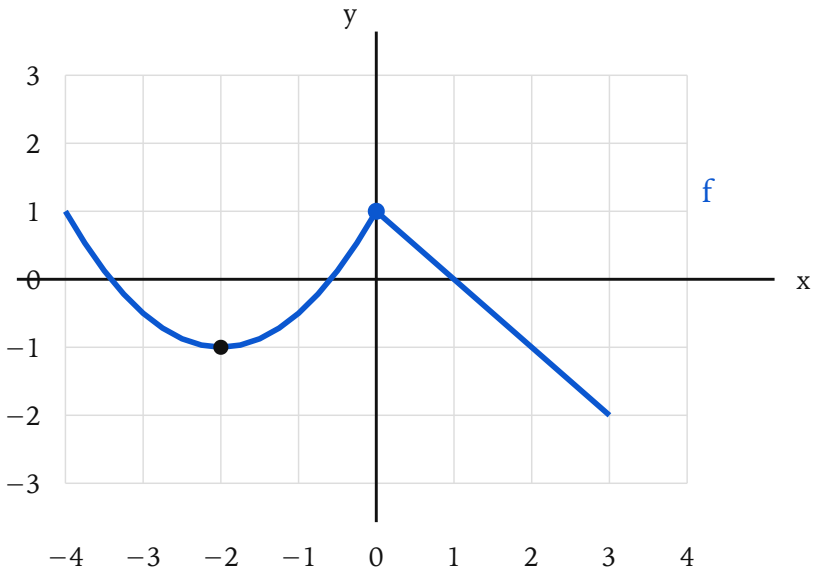
Find $h'(0)$, $h'(1)$, and $h'(4)$. If a derivative is not defined, say so.

A corner means the derivative of that function is not defined there. Read the slope of each piece. Do not invent one formula for the whole graph.



4. The graph of f is below. On this same grid, sketch f′. [4 points]

Shape matters more than exact heights. Mark a few slopes on f so the thinking is visible. Leave a hole where the derivative is not defined. The left piece is a parabola with its lowest point at $(-2, -1)$. At $x = 0$ it meets a straight line that ends at $(3, -2)$.



5. This graph is f′, not f. Open circles mean the derivative is not defined there. [3 points]

a. On which interval is f increasing?

b. Does f have a horizontal tangent anywhere in this picture? Say why.

c. What does the hole at $x = 0$ tell you about f?

