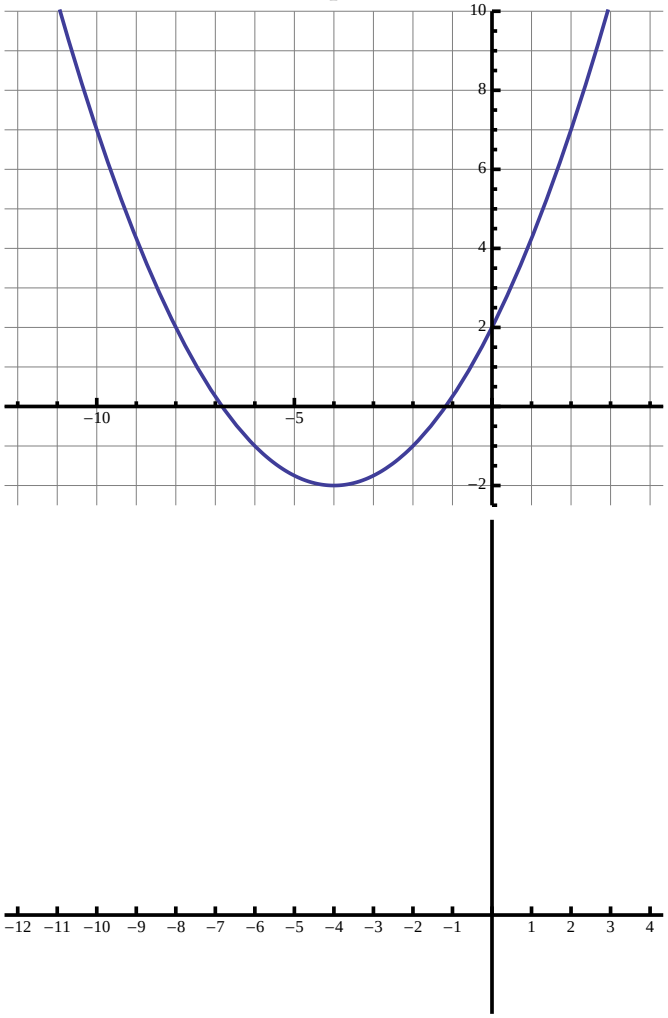
WORKSHEET §2.8: FINDING DERIVATIVES GRAPHICALLY

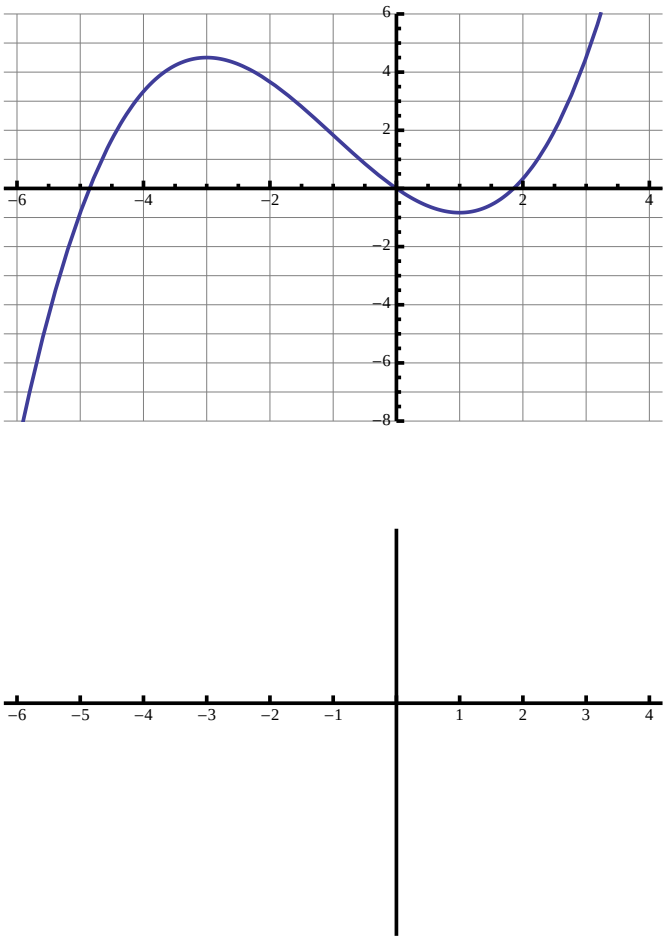
When you are asked to sketch the derivative on the provided axes, I am interested in the qualitative behavior of the derivative: Where does it cross the x-axis? Is it positive or negative? Is it a lot positive or a little positive? Are the slopes growing steeper or getting less steep? (This is why the y-axis is unmarked on the answer graphs.)

Exercise 1. Sketch the derivatives of graphs 1 and 2.

Graph 1



Graph 2



Exercise 2. The equation of Graph 1 is

$$f(x) = 2x + \frac{x^2}{4}.$$

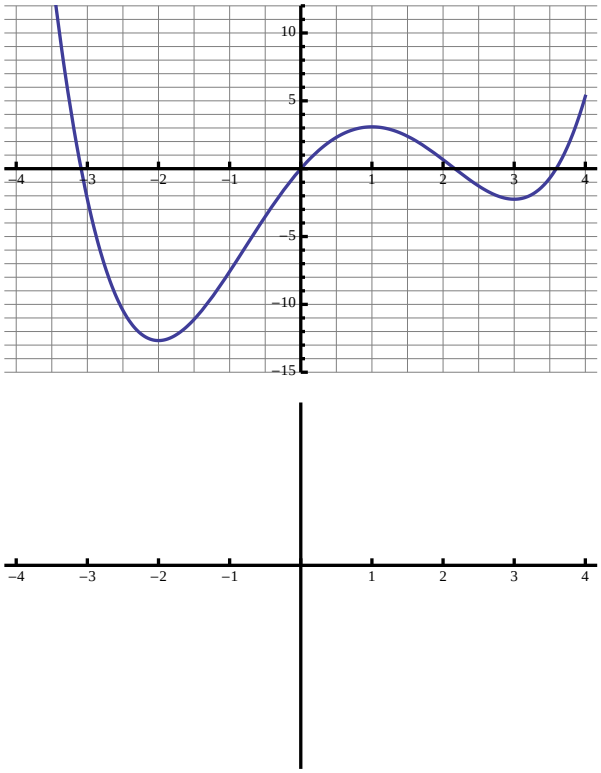
Recall

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

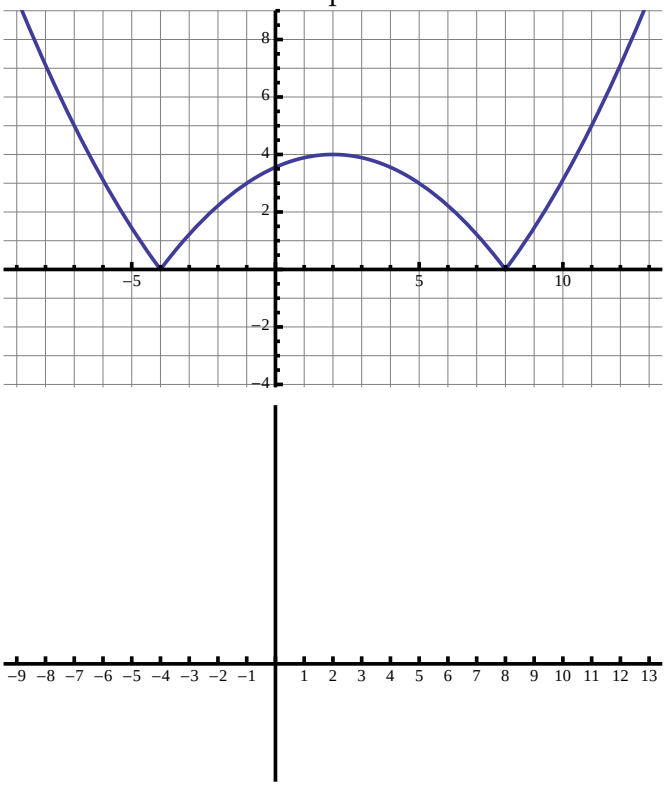
Use the definition of the derivative to compute the derivative $f'(x)$. (Attach a separate page if you need more room.) What kind of function is $f'(x)$? How does the graph of $f'(x)$ compare to the derivative you drew?

Exercise 3. Sketch the derivatives of graphs 3 and 4.

Graph 3



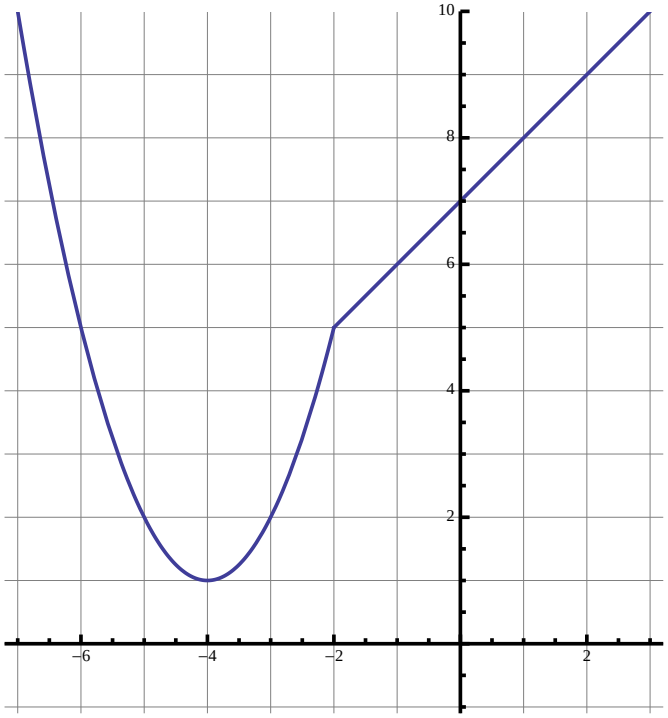
Graph 4

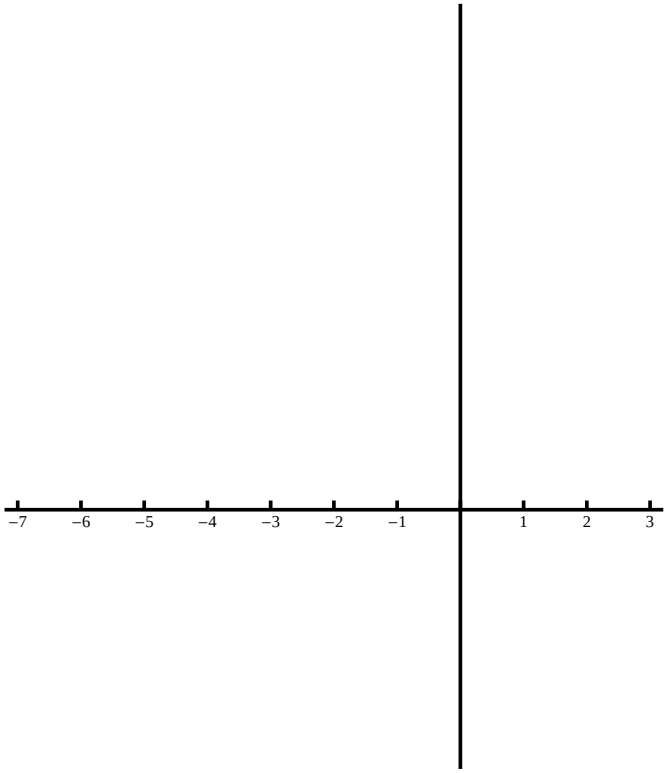


Exercise 4. What is an important difference between the derivative of graph 3 and the derivative of graph 4? Use terminology from calculus.

Exercise 5. Sketch the derivatives of graphs 5 and 6.

Graph 5





Graph 6