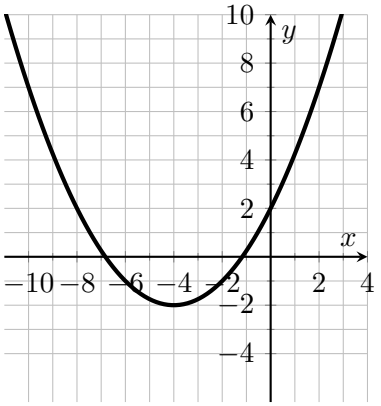
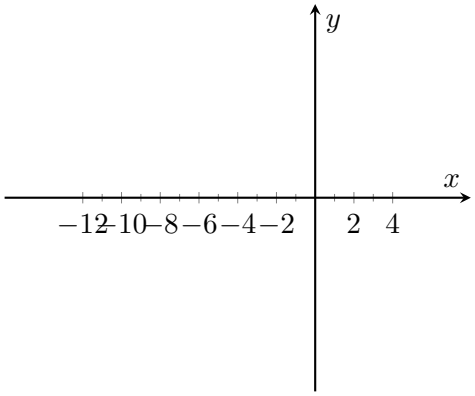
WORKSHEET: SECTION 2.8

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.)

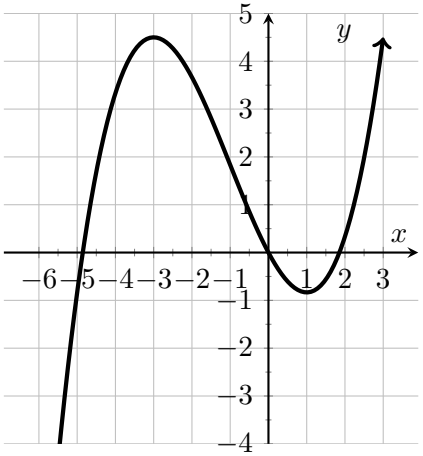
Exercise 1. Sketch the derivatives of the following graphs.

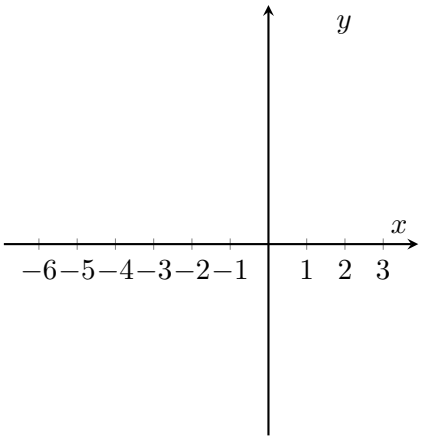
Graph 1



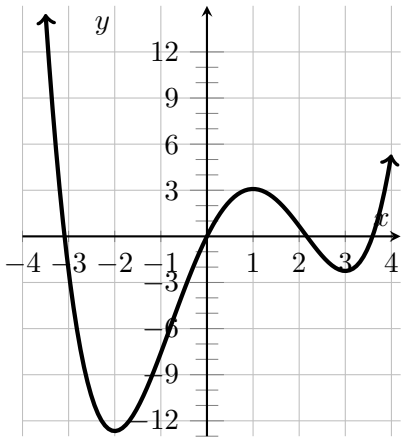


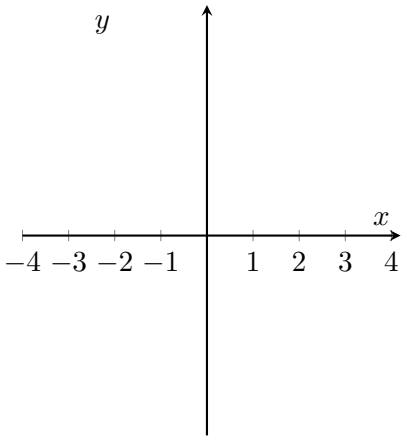
Graph 2





Graph 3





Exercise 2. Each of the graphs in Exercise 1 are polynomials. Fill in the blanks:

(a) Graph 1 looks like a _____ polynomial (the degree is _____) and the derivative of graph 1 looks like a _____ polynomial (the degree is _____).

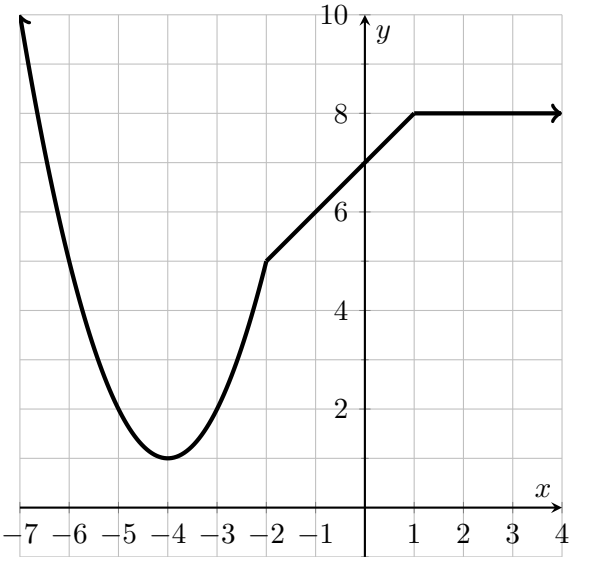
(b) Graph 2 looks like a _____ polynomial (the degree is _____) and the derivative of graph 2 looks like a _____ polynomial (the degree is _____).

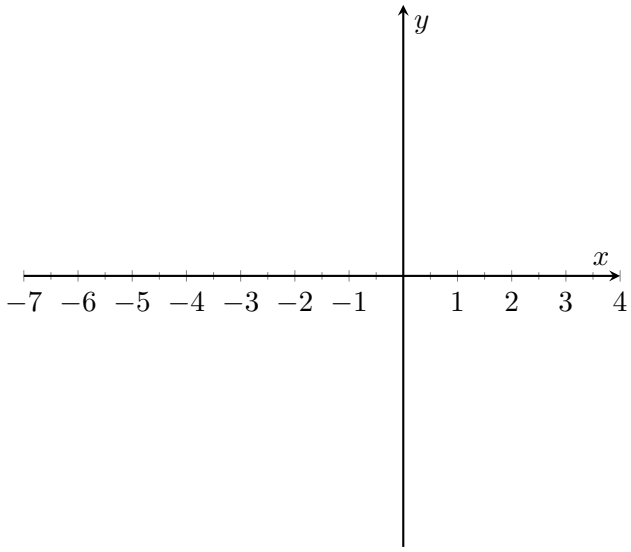
(c) Graph 3 looks like a _____ polynomial (the degree is _____) and the derivative of graph 3 looks like a _____ polynomial (the degree is _____).

(d) **Make a guess:** If $f(x)$ is a degree n polynomial, then $f'(x)$ is a degree _____ polynomial.

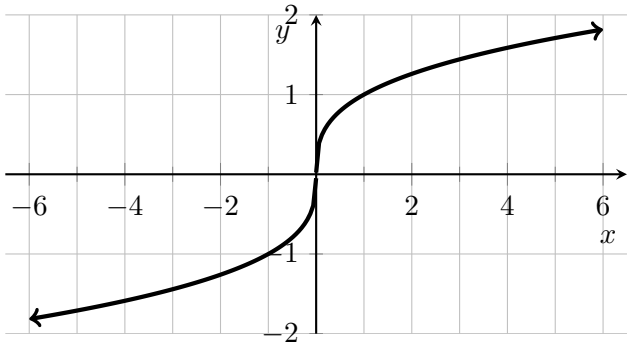
Exercise 3. Sketch the derivatives of graphs 4 and 5.

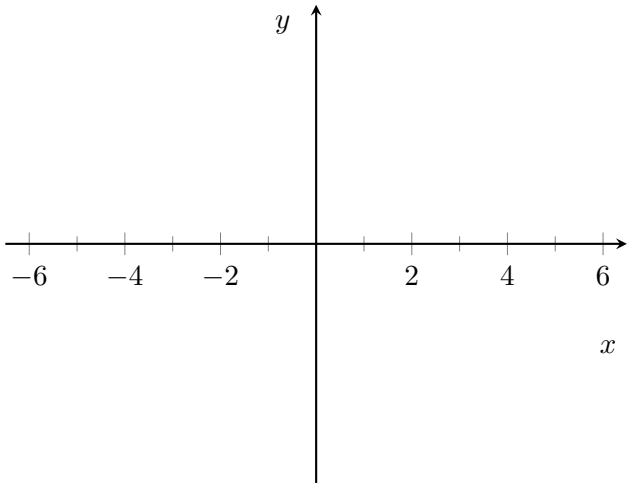
Graph 4





Graph 5





Exercise 4. What is an important difference between the derivative of graph 3 (from Exercise 1) and the derivative of graph 4? Use terminology from calculus.

Exercise 5. Explain why Graph 5 has a tangent line at x = 0, even though the derivative is undefined at $x = 0$.