

**The Derivative Function**  
**Homework Exercises**

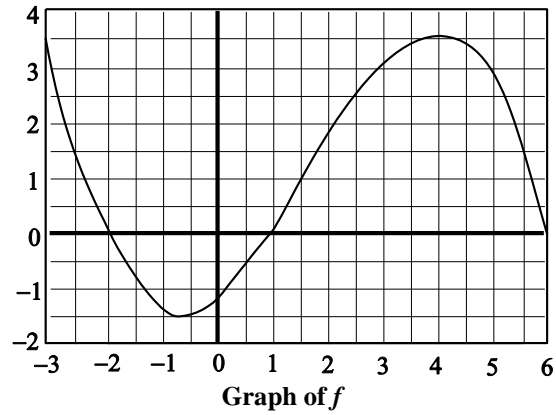
**Exercise 1:** Suppose that  $f$  is a locally linear function and you know that  $f(3) = 1$  and that  $f'(3) = -2$ .

a. Estimate  $f(3.1)$  and  $f(2.8)$ .

b. Find the equation of the tangent line to the graph of  $f$  at  $x = 3$ .

**Exercise 2.** The line tangent to  $f$  at  $x = 3$  passes through the points  $(-2, 3)$  and  $(3, -1)$ . Find  $f(3)$  and  $f'(3)$ . Justify your answers.

**Exercise 3.** The graph of a function  $f$  is shown below



a. Estimate the values for the missing entries and fill in the rest of the table.

$x$	-3	-2	-1	0	1	2	3	4	5	6
$f'(x)$	-5.3		-1	1.3	1.6		1		-1.8	-3.5

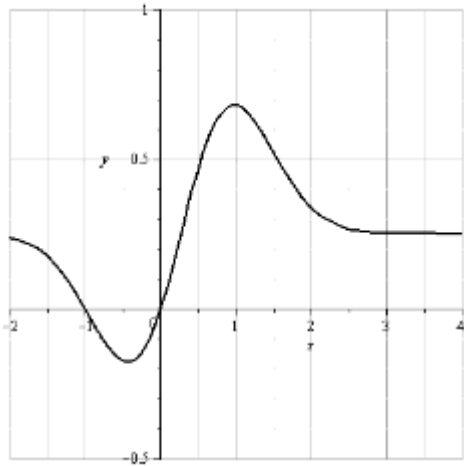
b. Use your answers to part a. to sketch a graph of  $f'$ .

**Exercise 4.** Sketch a graph of a function  $f$  that is consistent with these data:

$x$	-2	-1	1	5
$f(x)$	1	-1	-1	2
$f'(x)$	-3	0	-1	-2

**Exercise 5.** Consider the graph of the derivative of  $f$ , shown below. (The graph of  $f$  is not shown.)

**The graph of  $f'$**



**a.** Determine whether the graph of  $f$  is increasing or decreasing at  $x = 2$ . Explain your reasons.

**b.** Suppose that  $f(1) = -1$ . Find the equation of the tangent line to the graph of  $f$  at  $x = 1$ .

**c.** Suppose that  $f(-1) = 2$ . Explain why none of the following could be the tangent line to the graph of  $f$  at  $x = -1$ .

- i.  $y = 5x$       ii.  $y = 4(x+1) + 2$       iii.  $y = 2(x+3)$       iv.  $y = x+3$

**d.** Suppose that  $f(3) = -1$ . Explain why none of the following could be the tangent line to the graph of  $f$  at  $x = 0$ .

- i.  $y = \frac{1}{2}x$       ii.  $y = 4$       iii.  $y = .25(x-3)$       iv.  $y = .25(x-3)+1$