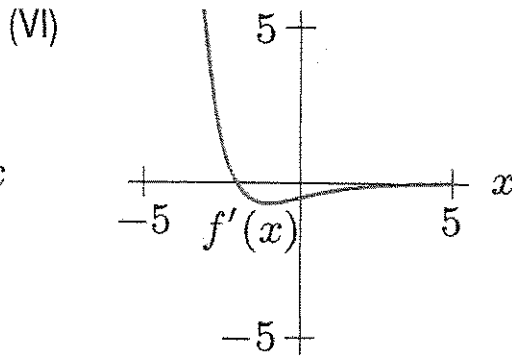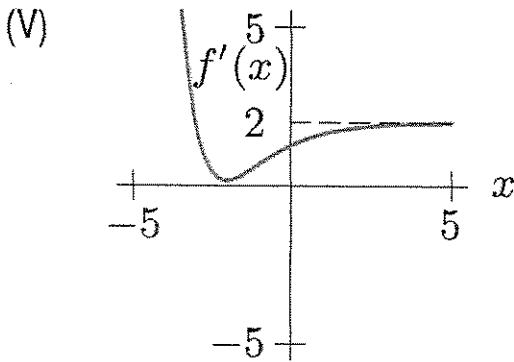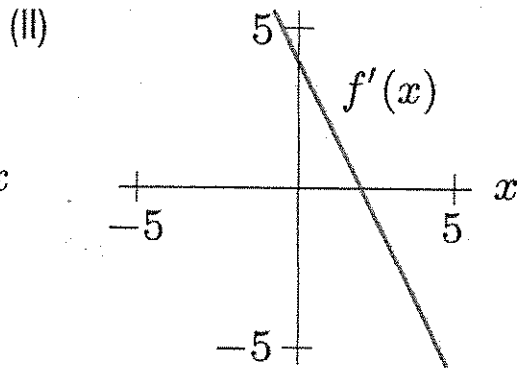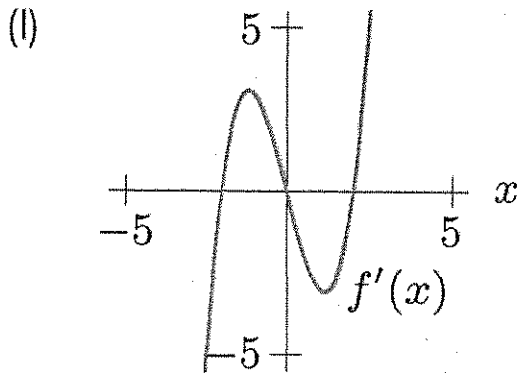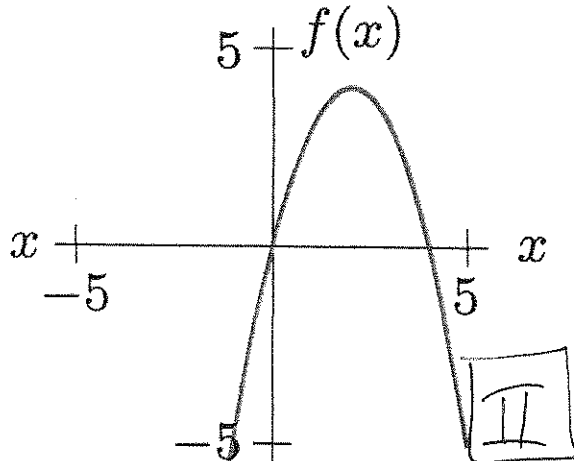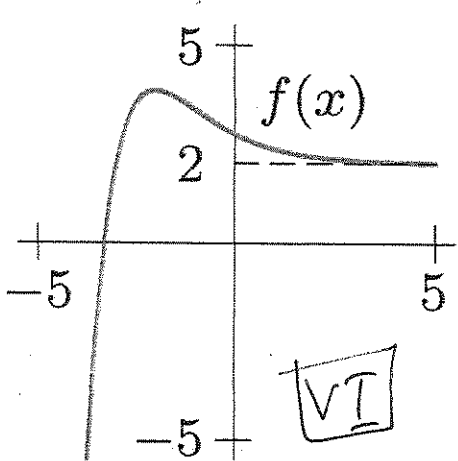Solutions

2.2: The Derivative Function

Definition: For a function f, we define the **derivative function**, f', by

$$f'(x) = \text{Instantaneous rate of change of } f \text{ at } x = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}.$$
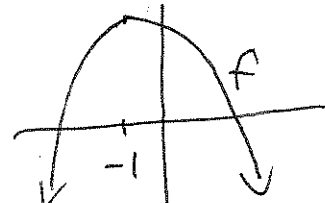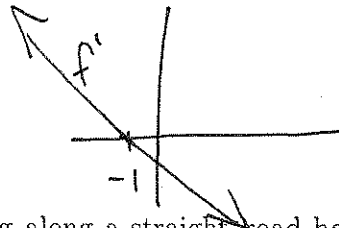
(I)

(II)

(V)

(VI)

Exercise 1: Match each of the two graphs below to one of the derivative graphs above.

$f(x)$

$f(x)$

VI

II

Exercise 2: Draw a possible graph of $y = f(x)$ given the following information about its derivative.

1. $f'(x) > 0$ for $x < -1$

2. $f'(x) < 0$ for $x > -1$

3. $f'(x) = 0$ for $x = -1$

Exercise 3: A vehicle moving along a straight road has distance $f(t)$ from its starting point at time t. Which of the graphs below could be $f'(t)$ for the following scenarios?

1. A bus on a popuar route, with no traffic II

2. A car with no traffic and all green lights I

3. A car in heavy traffic conditions III

(I)

(II)

(III)
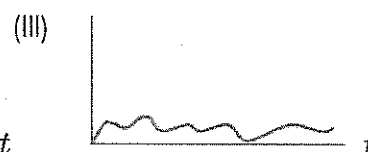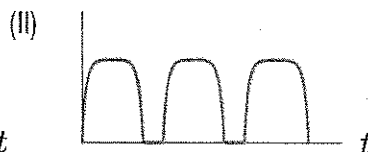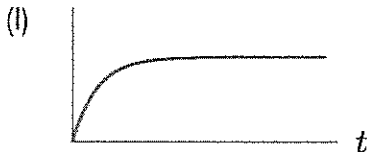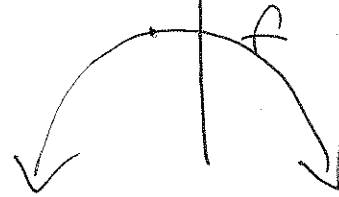
Exercise 4: Sketch the derivative of the function $f(x)$ given below.

$f(x)$

1 2 3 4 5 6 7

x
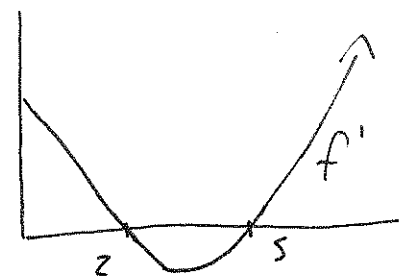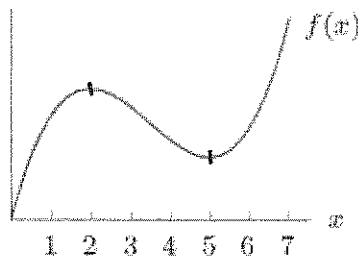
Exercise 5: Sketch the derivative of the function $f(x)$ given below.