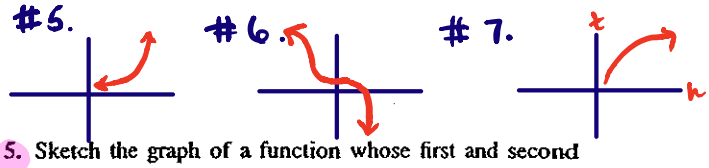
Part of Set B

#5. #6. #7.



Exercises and Problems for Section 2.6

Exercises

Part of set A

1. For the function graphed in Figure 2.52, are the following quantities positive or negative?

(a) $f(2)$ (b) $f'(2)$ (c) $f''(2)$

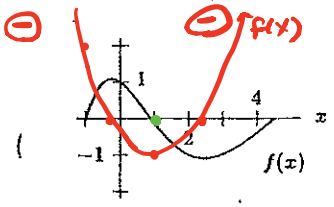
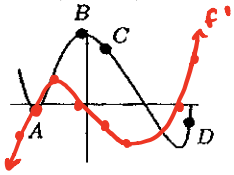


Figure 2.52

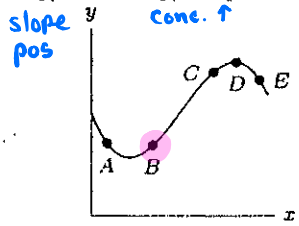
2. The graph of a function $f(x)$ is shown in Figure 2.53. On a copy of the table indicate whether f, f', f'' at each marked point is positive, negative, or zero.



Point	f	f'	f''
A	0	0	+
B	+	0	−
C	+	−	−
D	−	+	+

Figure 2.53

3. At which of the labeled points on the graph in Figure 2.54 are both dy/dx and d^2y/dx^2 positive?



Point B

Figure 2.54

4. The distance of a car from its initial position t minutes after setting out is given by $s(t) = 5t^2 + 3$ kilometers. What are the car's velocity and acceleration at time t? Give units.

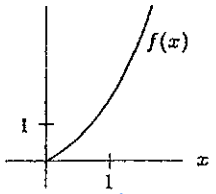
5. Sketch the graph of a function whose first and second derivatives are everywhere positive.

6. Sketch the graph of a function whose first derivative is everywhere negative and whose second derivative is positive for some x-values and negative for other x-values.

7. Sketch the graph of the height of a particle against time if velocity is positive and acceleration is negative.

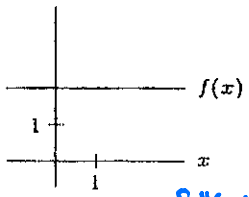
For Exercises 8–13, give the signs of the first and second derivatives for each of the following functions.

8.



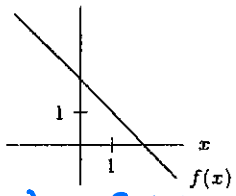
$f'(x) > 0, f''(x) > 0$

9.



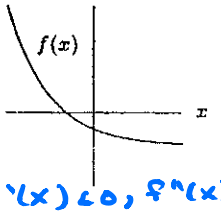
$f'(x) = 0, f''(x) = 0$

10.



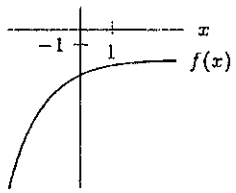
$f'(x) < 0, f''(x) = 0$

11.



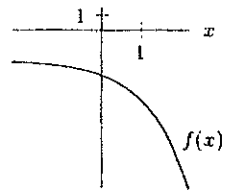
$f'(x) < 0, f''(x) > 0$

12.



$f'(x) > 0, f''(x) < 0$

13.



$f'(x) < 0, f''(x) < 0$

Problems

14. The table gives the number of passenger cars, $C = f(t)$, in millions, in the US in the year t.

(a) Do $f'(t)$ and $f''(t)$ appear to be positive or negative during the period 1940–1980?

(b) Estimate $f'(1975)$. Using units, interpret your answer in terms of passenger cars.

t (year)	1940	1950	1960	1970	1980
C (cars, in millions)	27.5	40.3	61.7	89.3	121.6

15. An accelerating sports car goes from 0 mph to 60 mph in five seconds. Its velocity is given in the following table, converted from miles per hour to feet per second, so that all time measurements are in seconds. (Note: 1 mph is 22/15 ft/sec.) Find the average acceleration of the car over each of the first two seconds.

Time, t (sec)	0	1	2	3	4	5
Velocity, $v(t)$ (ft/sec)	0	30	52	68	80	88