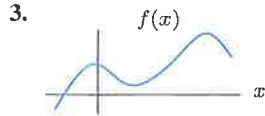
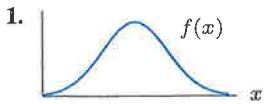


Problems for Section 4.1

In Problems 1–4, indicate all critical points of the function f . How many critical points are there? Identify each critical point as a local maximum, a local minimum, or neither.



5. (a) Graph a function with two local minima and one local maximum.

(b) Graph a function with two critical points. One of these critical points should be a local minimum, and the other should be neither a local maximum nor a local minimum.

17. On the graph of f' in Figure 4.14, indicate the x -values that are critical points of the function f itself. Are they local maxima, local minima, or neither?

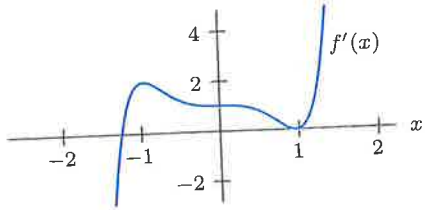


Figure 4.14: Graph of f' (not f)

19. If U and V are positive constants, find all critical points of

$$F(t) = Ue^t + Ve^{-t}.$$

23. Find and classify the critical points of $f(x) = x^3(1-x)^4$ as local maxima and minima.

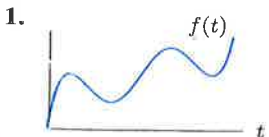
31. Find the value of a so that the function $f(x) = xe^{ax}$ has a critical point at $x = 3$.

35. If a and b are nonzero constants, find the domain and all critical points of

$$f(x) = \frac{ax^2}{x-b}.$$

Problems for Section 4.2

In Problems 1–4, indicate the approximate locations of all inflection points. How many inflection points are there?



21. Find the inflection points of $f(x) = x^4 + x^3 - 3x^2 + 2$.

Problems for Section 4.3

For the functions in Problems 18–22, do the following:

(a) Find f' and f'' .

(b) Find the critical points of f .

(c) Find any inflection points of f .

(d) Evaluate f at its critical points and at the endpoints of the given interval. Identify local and global maxima and minima of f in the interval.

19. $f(x) = 2x^3 - 9x^2 + 12x + 1$ ($-0.5 \leq x \leq 3$)

In Problems 23–28, find the exact global maximum and minimum values of the function. The domain is all real numbers unless otherwise specified.

23. $g(x) = 4x - x^2 - 5$

25. $g(t) = te^{-t}$ for $t > 0$

27. $f(t) = \frac{t}{1+t^2}$

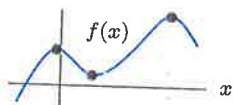
Home work
#13

Section 4.1

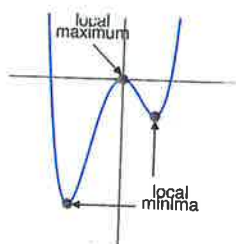
1 One



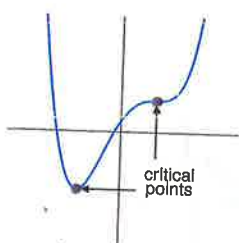
3 Three



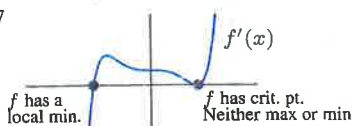
5 (a)



(b)



17



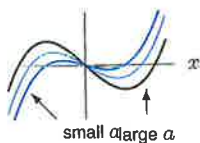
19 $t = 0.5 \ln(V/U)$

- 21 (a) $x \approx 2.5$ (or any $2 < x < 3$)
 $x \approx 6.5$ (or any $6 < x < 7$)
 $x \approx 9.5$ (or any $9 < x < 10$)

- (b) $x \approx 2.5$: local max;
 $x \approx 6.5$: local min;
 $x \approx 9.5$: local max.

- 23 $x = 0$: not max/min
 $x = 3/7$: local max
 $x = 1$: local min

25 (a)

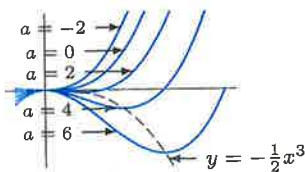


(b) 2 critical points move farther from origin

(c) $x = \pm \sqrt{a/3}$

27 $a = -6; b = 14$

29



31 $a = -1/3$

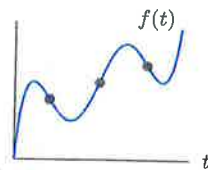
33 (a) $x = 0, x = a^2/4$

(b) $a = \sqrt{20}$; Local minimum

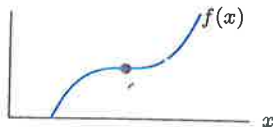
35 Domain: All real numbers except $x = b$;
 Critical points: $x = 0, x = 2b$

Section 4.2

1 Three



3 One



21 $x = -1, 1/2$

Section 4.3

19 (a) $f'(x) = 6x^2 - 18x + 12$,

$f''(x) = 12x - 18$.

(b) $x = 1, 2$

(c) $x = 3/2$

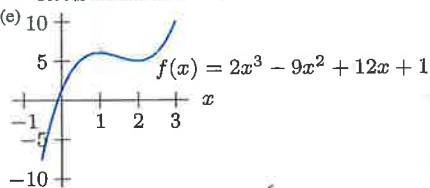
(d) Local minimum: $x = 2$

Local maximum: $x = 1$

Global minimum: $x = -0.5$

Global maximum: $x = 3$

(e) 10



23 Global max = -1 at $x = 2$
 No global min

25 Global max = $1/e$ at $t = 1$
 No global min

27 Global max = $1/2$ at $t = 1$
 Global min = $-1/2$ at $t = -1$

Solutions