CALCULUS

Even more graphing problems

NEW

0500-1. Let $f : (0, 15)\backslash\{7\} \to \mathbb{R}$ be as shown.
NEW

a. Find the maximal intervals on which

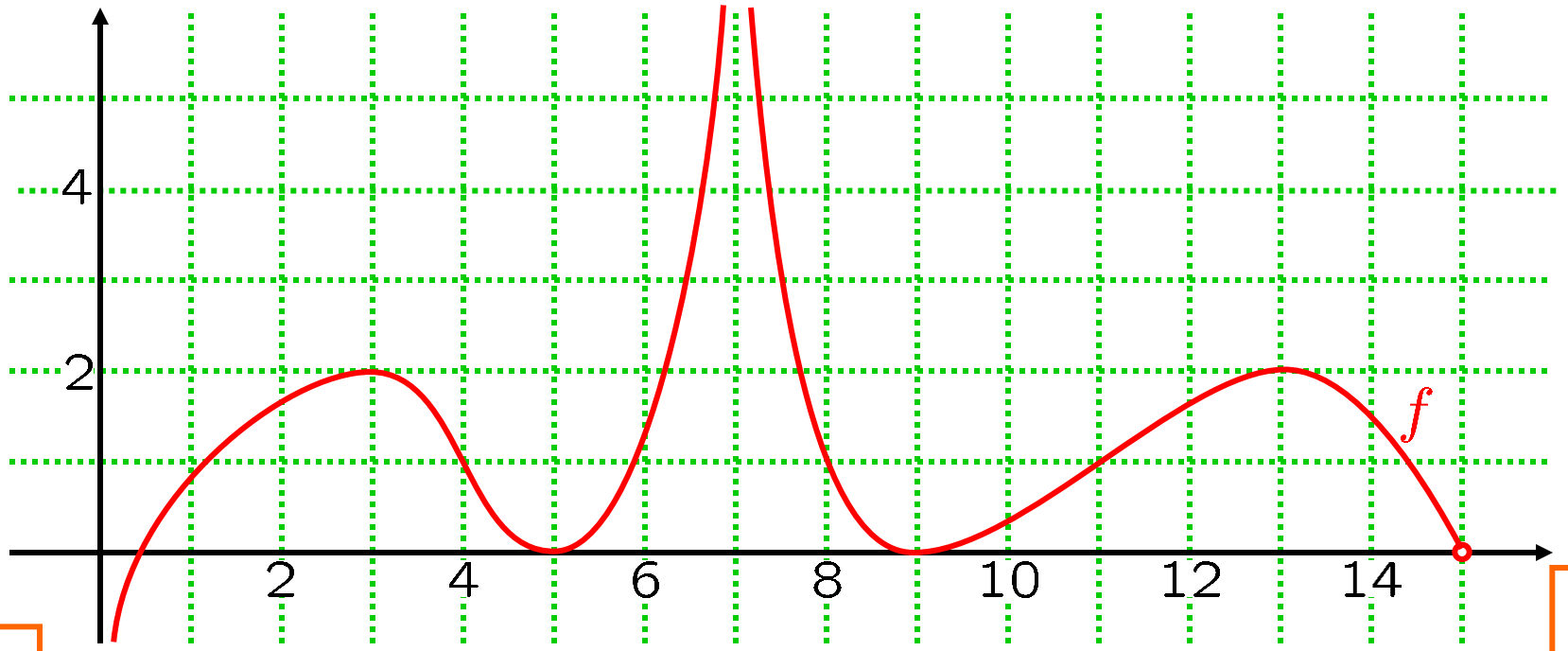
(i) f is increasing;

(ii) f is decreasing;

(iii) f is concave up;

and (iv) f is concave down.

b. Find all points of inflection for f.

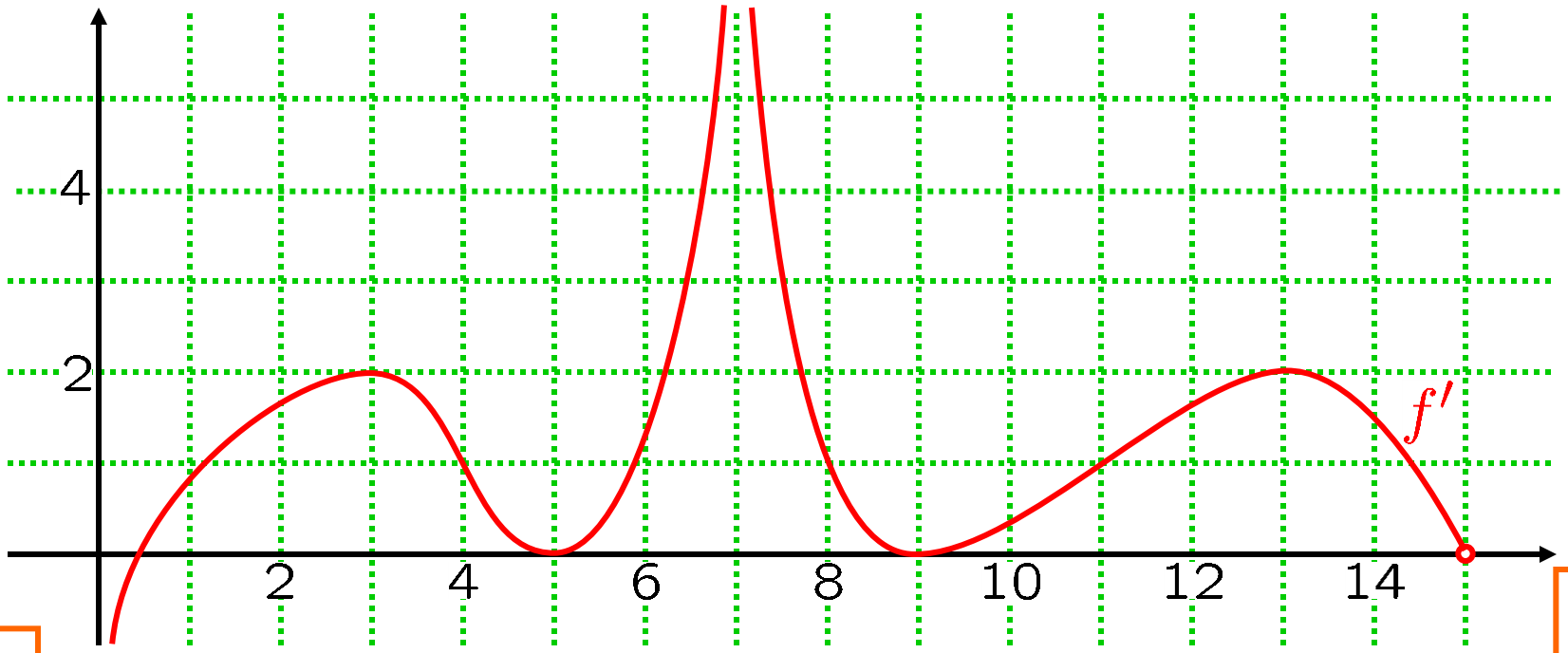


0500-2. NEW Let $f : [0, 15)\backslash\{7\} \to \mathbb{R}$ be contin from the rt at 0. The graph of f' is shown below.

Find the maximal intervals on which

(i) f is concave up;

and (ii) f is concave down.

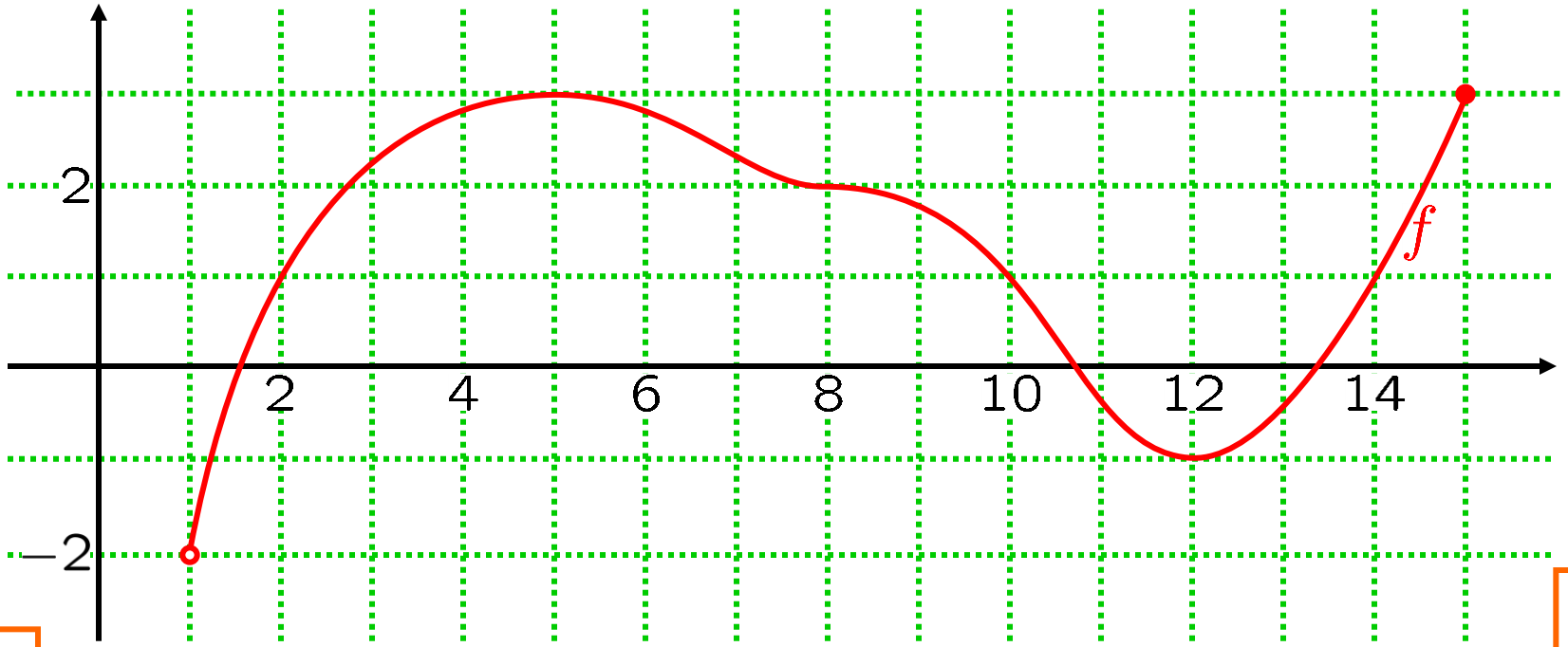


0500-3. Let $f : (0, 14] \to \mathbb{R}$ be as shown.

NEW

a. Find the maximal intervals on which
(i) f is increasing;
and (ii) f is decreasing.

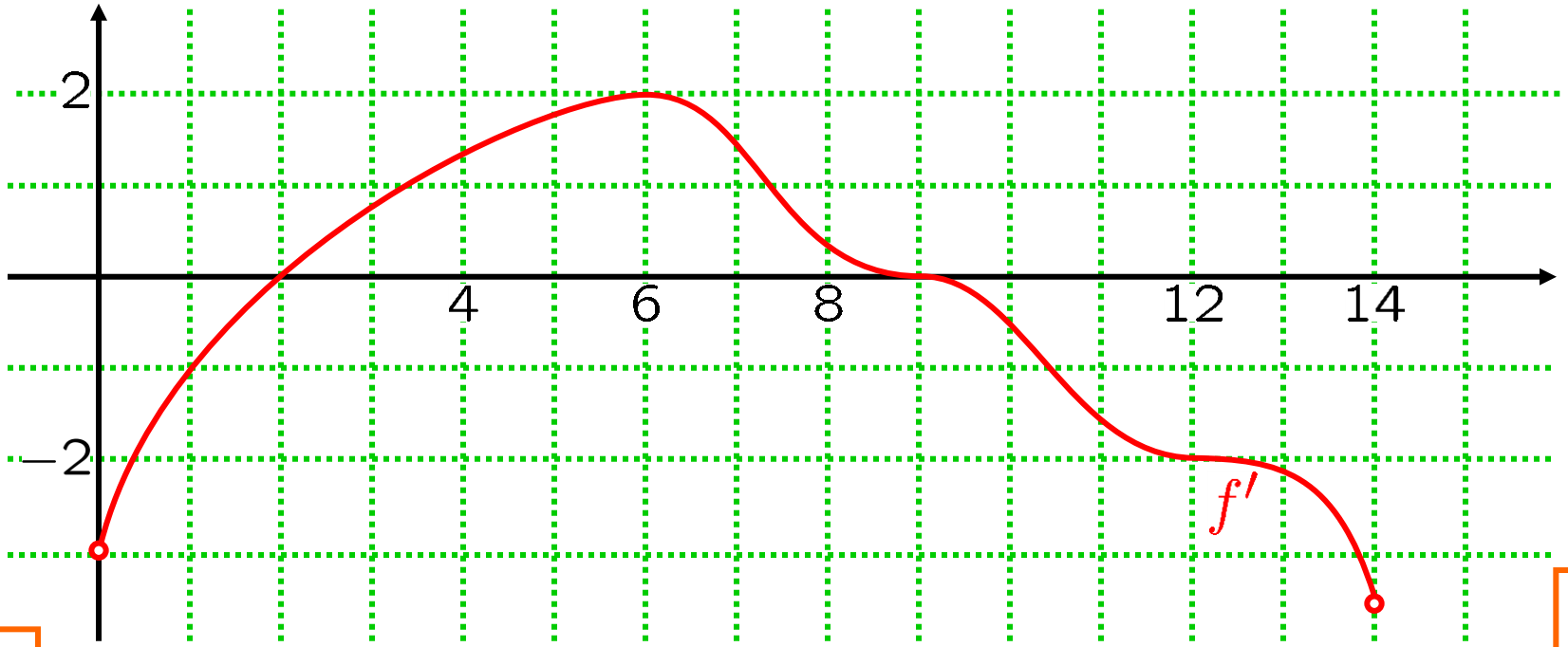
b. Find all numbers at which
(i) f attains a local maximum;
and (ii) f attains a local minimum.



0500-4. NEW Let f be contin on $(0, 14]$.
The graph of f' is shown below.

a. Find the maximal intervals on which
(i) f is concave up;
and (ii) f is concave down.

b. At what numbers does f have
(i) a local maximum?
(ii) a local minimum?



0500-5. NEW Let $f(x) = 2x^4 + 8x^3 + 9x^2 + 9$.

a. Find the maximal intervals on which

(i) f is increasing;

and (ii) f is decreasing.

b. Find all numbers at which

(i) f attains a local maximum;

and (ii) f attains a local minimum.

c. Find the maximal intervals on which

(i) f is concave up;

and (ii) f is concave down.

0500-6. NEW Let $f(x) = (x^2 + 2x + 3)e^x$.

a. Find the maximal intervals on which
(i) f is increasing;
and (ii) f is decreasing.

b. Find all numbers at which
(i) f attains a local maximum;
and (ii) f attains a local minimum.

c. Find the maximal intervals on which
(i) f is concave up;
and (ii) f is concave down.

d. Find all points of inflection for f.

0500-7. NEW Let $f(x) = e^{4x-2x^2}$.

a. Find all critical numbers for f.

b. For each critical number for f, use the Second Derivative Test to determine whether, at that number, the function f has a local maximum or a local minimum.

0500-8. NEW Let $f(x) = x^3 e^{-x^2/2}$.

a. Find all critical numbers for f.

b. For each critical number for f, what does the Second Derivative Test tell you about that critical number?

c. For each critical number for f, use the First Derivative Test to determine whether, at that number, the function f has a local maximum or a local minimum.

0500-9. NEW Sketch the graph of a function

$$H : [0, 8] \to \mathbb{R}$$

with the following properties:

- (•) H is continuous on $[0, 8]$;
- (•) H'' is continuous on $(0, 8)$;
- (•) $H(0) = 0$; $H(4) = H(8) = 2$;
- (•) $H'(2) = H'(4) = H'(6) = 0$;
- (•) $H'' < 0$ on $(0, 3)$;
- and (•) $H'' < 0$ on $(5, 8)$.

0500-10. NEW Find a cubic $g(t) = at^3 + bt^2 + ct + d$ s.t. g attains a local min value of 20 at -1 and a local max value of -16 at 1.

0500-11. NEW Let $f(x) = \cot^3(x/2)$.

a. Describe the symmetries, if any, of f.

b. Find all max intervals of pos/neg for f.
Also:
(i) What is the domain of f?
(ii) Find all x- and y-intercepts of f.
(iii) Find all vert/horiz asymptotes of f.

c. Find all max intervals of incr/decr for f.

d. Find all max intervals of cc up/cc dn for f.

e. Sketch the graph of f.

0500-12. NEW Let $f(x) = \ln(9 - x^2)$.

a. Describe the symmetries, if any, of f.

b. Find all max intervals of pos/neg for f.
Also:
(i) What is the domain of f?
(ii) Find all x- and y-intercepts of f.
(iii) Find all vert/horiz asymptotes of f.

c. Find all max intervals of incr/decr for f.

d. Find all max intervals of cc up/cc dn for f.

e. Sketch the graph of f.

0500-13. NEW Let $f(x) = \dfrac{2x}{\sqrt{9 - x^2}}$.

a. Describe the symmetries, if any, of f.

b. Find all max intervals of pos/neg for f.
Also:
(i) What is the domain of f?
(ii) Find all x- and y-intercepts of f.
(iii) Find all vert/horiz asymptotes of f.

c. Find all max intervals of incr/decr for f.

d. Find all max intervals of cc up/cc dn for f.

e. Sketch the graph of f.

0500-14 NEW. Let $f(x) = x^5 + 5x^3$.

a. Describe the symmetries, if any, of f.

b. Find all max intervals of pos/neg for f.
Also:
(i) What is the domain of f?
(ii) Find all x- and y-intercepts of f.
(iii) Find all vert/horiz asymptotes of f.

c. Find all max intervals of incr/decr for f.

d. Find all max intervals of cc up/cc dn for f.

e. Sketch the graph of f.

OPTIONAL PROBLEM,
NOT ASSIGNED

0500-15. NEW Let $f(x) = \dfrac{1}{x^3 - 1}$.

a. Describe the symmetries, if any, of f.

b. Find all max intervals of pos/neg for f.
Also:
(i) What is the domain of f?
(ii) Find all x- and y-intercepts of f.
(iii) Find all vert/horiz asymptotes of f.

c. Find all max intervals of incr/decr for f.

d. Find all max intervals of cc up/cc dn for f.

e. Sketch the graph of f.

OPTIONAL PROBLEM,
NOT ASSIGNED

0500-16. NEW Let $f(x) = \sqrt{x^2 + 4x + 7}$.

a. Describe the symmetries, if any, of f.

b. Find all max intervals of pos/neg for f.
Also:
(i) What is the domain of f?
(ii) Find all x- and y-intercepts of f.
(iii) Find all vert/horiz asymptotes of f.

c. Find all max intervals of incr/decr for f.

d. Find all max intervals of cc up/cc dn for f.

e. Sketch the graph of f.

OPTIONAL PROBLEM,
NOT ASSIGNED

0500-17. NEW Let $f(x) = 2x + 1 - \cos x$.

a. Describe the symmetries, if any, of f.

b. Find all max intervals of pos/neg for f.
Also:
(i) What is the domain of f?
(ii) Find all x- and y-intercepts of f.
(iii) Find all vert/horiz asymptotes of f.

c. Find all max intervals of incr/decr for f.

d. Find all max intervals of cc up/cc dn for f.

e. Sketch the graph of f.

OPTIONAL PROBLEM,
NOT ASSIGNED

0500-18. NEW Let $f(x) = -2x^2 e^{-x^2/2}$.

a. Describe the symmetries, if any, of f.

b. Find all max intervals of pos/neg for f.
Also:
(i) What is the domain of f?
(ii) Find all x- and y-intercepts of f.
(iii) Find all vert/horiz asymptotes of f.

c. Find all max intervals of incr/decr for f.

d. Find all max intervals of cc up/cc dn for f.

e. Sketch the graph of f.

OPTIONAL PROBLEM, NOT ASSIGNED

0500-19. NEW Let $f(x) = \dfrac{x^2 - 6x - 7}{x - 1}$.

a. Describe the symmetries, if any, of f.

b. Find all max intervals of pos/neg for f.
Also:

(i) What is the domain of f?

(ii) Find all x- and y-intercepts of f.

(iii) Find all vert/horiz asymptotes of f.

c. Find all max intervals of incr/decr for f.

d. Find all max intervals of cc up/cc dn for f.

e. Sketch the graph of f.