

CALCULUS
Even more graphing problems
NEW

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

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.

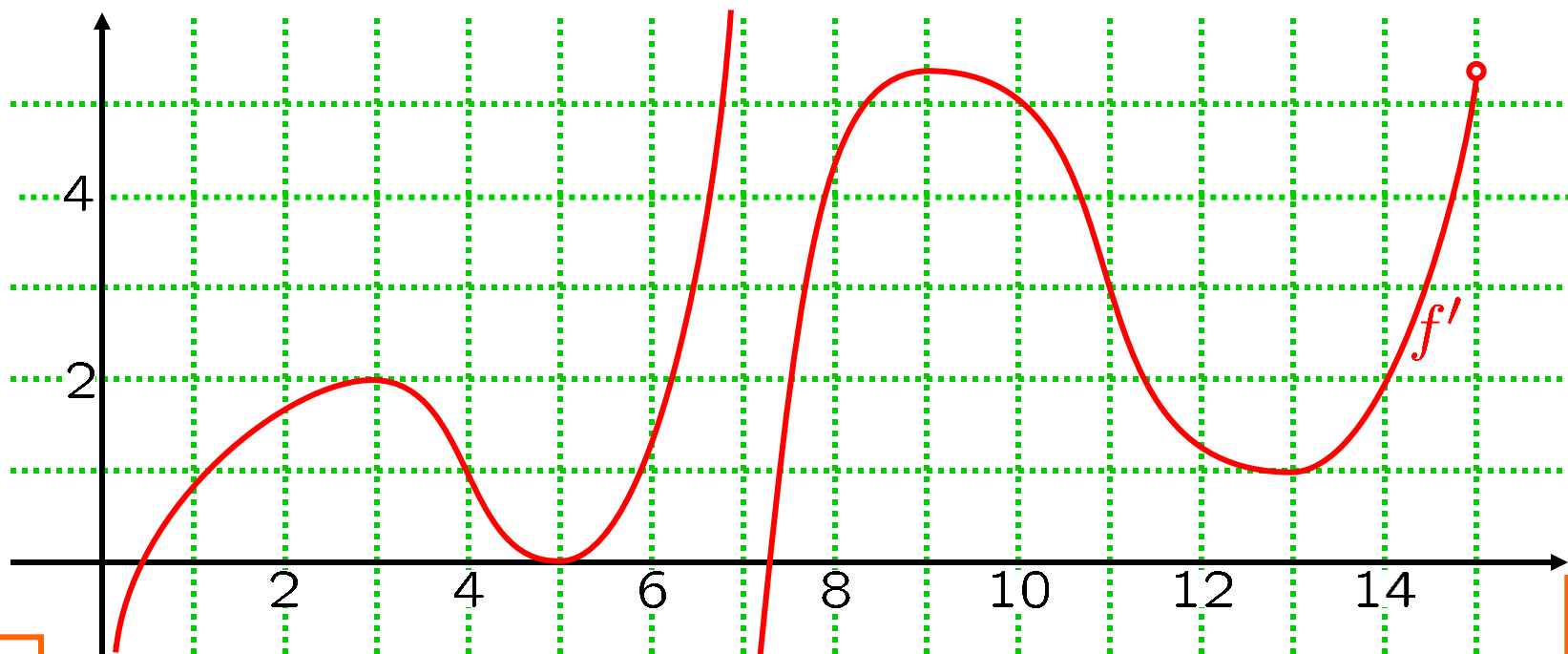
b. Find all points of inflection for f .



0500-2. ^{NEW} Let $f : (0, 15] \setminus \{7\} \rightarrow \mathbb{R}$ be contin from the left at 15. The graph of f' is shown below.

Find the maximal intervals on which

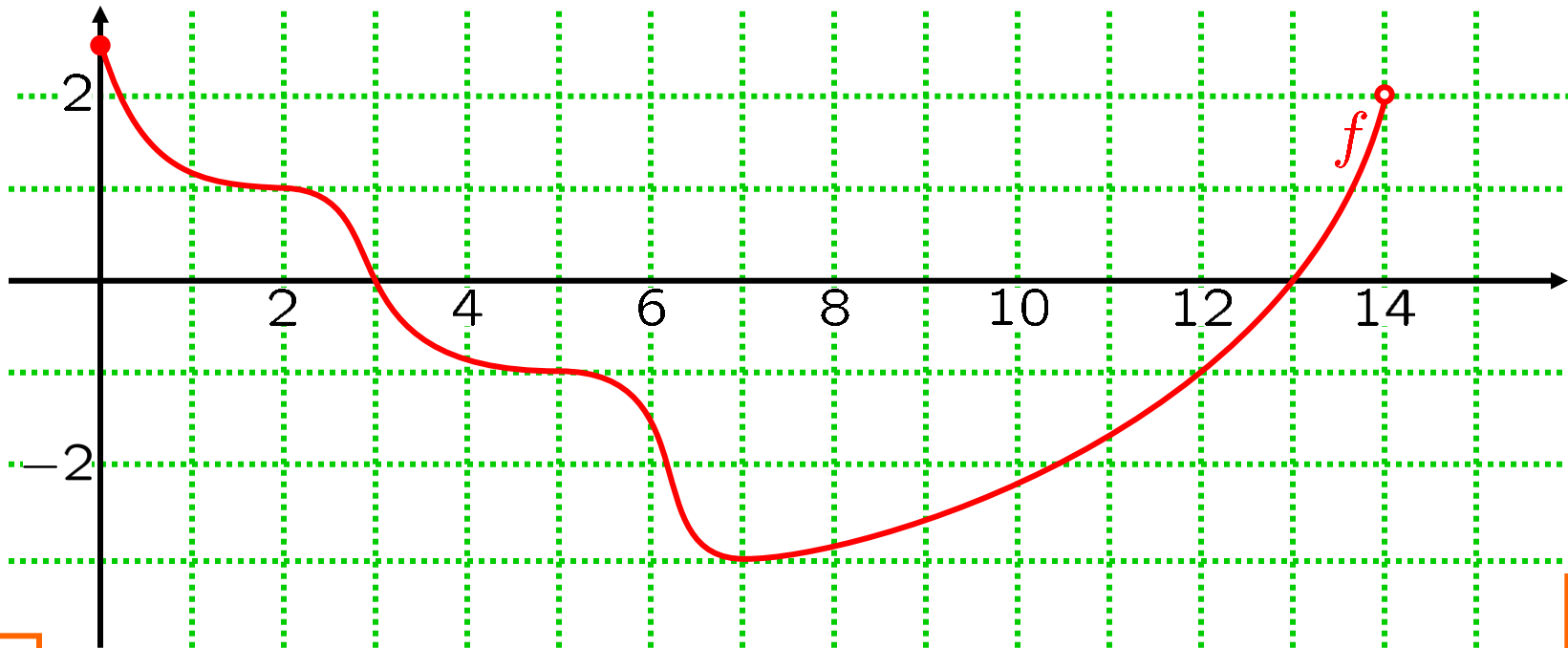
- (i) f is concave up;
- and (ii) f is concave down.



0500-3. Let $f : [0, 14) \rightarrow \mathbb{R}$ be as shown.

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 $[0, 14]$.

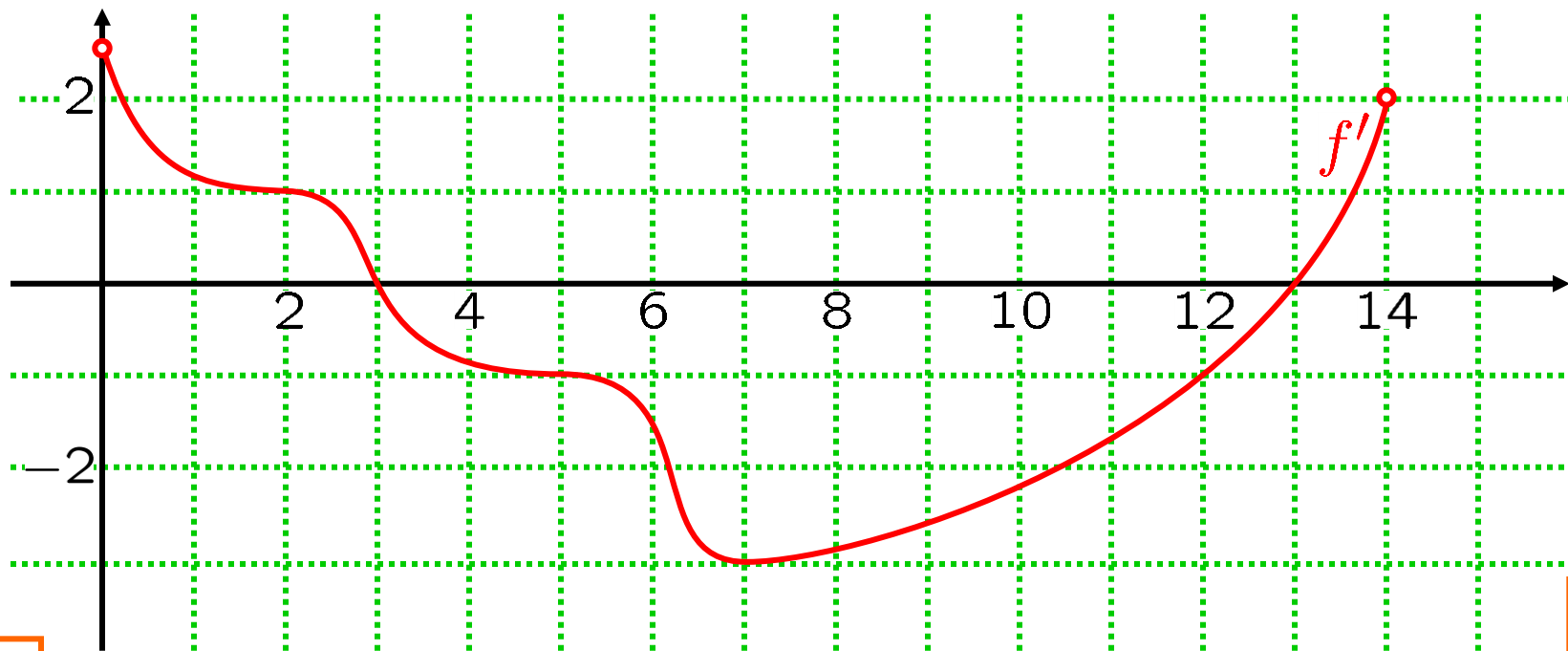
The graph of f' is shown below.

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. Let $f(x) = x^4 + 3x^3 + 3x^2 - 7$.

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.

c. Find the maximal intervals on which

- (i) f is concave up;
- and (ii) f is concave down.

0500-6. NEW Let $f(x) = (9x^2 - 6x + 2)e^{-3x}$.

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. Let $f(x) = xe^{8x^3}/3$.

NEW

- 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. Let $f(x) = x^4 e^{-x^2/2}$.

NEW

- 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. **Sketch** the graph of a function

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

with the following properties:

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

0500-10. **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 -88 at 1.

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

- 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 $f(x) = \ln(5 - x^2)$.

- 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 $f(x) = \frac{2x}{\sqrt{5-x^2}}$.

- 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 $f(x) = x^4 + 5x^2$.

- 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 .

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

- 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 .

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

NEW

- 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 .

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

NEW

- 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 .

0500-18. Let $f(x) = x^2 e^{-x^2/8}$.

NEW

- 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 .

0500-19. Let $f(x) = \frac{x^2 - 4x + 3}{x - 1}$.

- 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 .