← MAT2601_ONL8FA_ONL8F_21 - Calculus, Fall 2021

Week 4 Homework MAT2601 (Homework)

INSTRUCTOR
Erin Cawley
SOUTH COLLEGE

Current Score

QUESTION	1	2	3	4	5	6	7	8	9	10	11	12	13
POINTS	–/6.66	–/6.66	–/6.66	–/6.66	–/6.66	–/6.66	–/6.66	–/6.66	–/6.66	–/6.66	–/6.66	–/6.66	–/6.6

TOTAL SCORE

–/100	0.0%

Due Date

TUE, OCT 26, 2021
11:59 PM EDT

Request Extension

Assignment Submission & Scoring

Assignment Submission

For this assignment, you submit answers by questions. You are required to use a new randomization after every 3 question submissions.

Assignment Scoring

Your best submission for each question part is used for your score.

1. **[-/6.66 Points]** DETAILS **HARMATHAP12 10.3.001.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

Find the absolute maxima and minima for $f(x)$ on the interval $[a, b]$.

$f(x) = x^3 - 2x^2 - 4x + 6, \quad [-1, 3]$

$(x, y) = ($

absolute maximum

$)$

$(x, y) = ($

absolute minimum

$)$

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2. [-/6.66 Points] DETAILS HARMATHAP12 10.3.003.EP. 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

Consider the function $f(x) = x^3 + x^2 - x + 6$ on the interval $[-3, 0]$.

Find $f'(x)$.

$f'(x) =$

Find the critical value of $f(x)$ on the interval $[-3, 0]$.

$x =$

Evaluate the function at the critical value.

$(x, y) = ($)

Evaluate the function at the endpoints of the given interval.

( )

$(x, y) =$) (smaller x-value)

( )

$(x, y) =$) (larger x-value)

Find the absolute maxima and minima for $f(x)$ on the interval $[-3, 0]$.

( )

absolute maximum $(x, y) =$)

absolute minimum $(x, y) =$

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3. **[-/6.66 Points]** DETAILS **HARMATHAP12 10.3.009.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

If the total revenue function for a computer is $R(x) = 1400x - 29x^2 - x^3$, find the level of sales, x, that maximizes revenue and find the maximum revenue in dollars.

$x =$ ____ computers

$R(x) = \$$ ____

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4. **[-/6.66 Points]** DETAILS **HARMATHAP12 10.3.019.MI.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

If the total cost function for a product is $C(x) = 90 + 0.1x^2$ dollars, producing how many units, x, will result in a minimum average cost per unit?

$x =$ ____ units

Find the minimum average cost per unit.

$\$$ ____

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5. **[-/6.66 Points]** DETAILS **HARMATHAP12 10.3.032.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

A firm can produce 100 units per week. If its total cost function is $C = 300 + 1100x$ dollars and its total revenue function is $R = 1200x - x^2$ dollars, how many units, x, should it produce to maximize its profit?

$x =$ ____ units

Find the maximum profit.

$\$$ ____

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6. **[-/6.66 Points]** DETAILS **HARMATHAP12 10.4.001.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

The manufacturer of GRIPPER tires modeled its return to sales from television advertising expenditures in two regions, as follows:

Region 1: $S_1 = 20 + 22x_1 - 0.4x_1^2$

Region 2: $S_2 = 30 + 24x_2 - 1.3x_2^2$

where S_1 and S_2 are the sales revenue in millions of dollars and x_1 and x_2 are millions of dollars of expenditures for television advertising. (Round your answers to three decimal places.)

(a) What advertising expenditures would maximize sales revenue in each district?

Region 1 $ [ ] million

Region 2 $ [ ] million

(b) How much money will be needed to maximize sales revenue in both districts?

$ [ ] million

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7. **[-/6.66 Points]** DETAILS **HARMATHAP12 10.4.007.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

Suppose that the demand x (in units) for a product is $x = 16{,}000 - 200p$, where p dollars is the market price per unit. Then the consumer expenditure for the product is

$$E = px = 16{,}000p - 200p^2.$$

For what market price will expenditure be greatest?

$ [ ]

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8. **[-/6.66 Points]** DETAILS **HARMATHAP12 10.4.015.MI.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

Two equal rectangular lots are enclosed by fencing the perimeter of a rectangular lot and then putting a fence across its middle. If each lot is to contain 2,700 square feet, what is the minimum amount of fence (in ft) needed to enclose the lots (include the fence across the middle)?

[ ] ft

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9. **[-/6.66 Points]** DETAILS **HARMATHAP12 10.4.019.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

A rectangular area is to be enclosed and divided into thirds. The family has $520 to spend for the fencing material. The outside fence costs $10 per foot installed, and the dividers cost $20 per foot installed. What are the dimensions that will maximize the area enclosed? (The answer contains a fraction.)

a side parallel to the dividers ____ ft

a side perpendicular to the dividers ____ ft

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10. **[-/6.66 Points]** DETAILS **HARMATHAP12 10.4.031.MI.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

A printer has a contract to print 100,000 posters for a political candidate. He can run the posters by using any number of plates from 1 to 30 on his press. If he uses x metal plates, they will produce x copies of the poster with each impression of the press. The metal plates cost $20.00 to prepare, and it costs $168.20 per hour to run the press. If the press can make 1000 impressions per hour, how many metal plates should the printer make to minimize costs?

____ plates

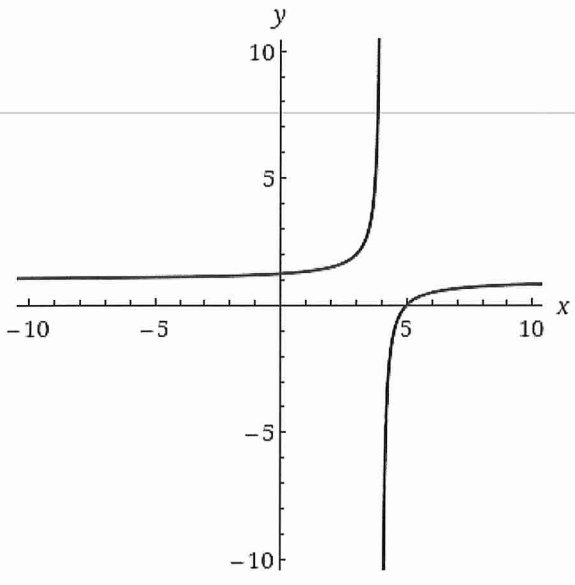
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11. [-/6.66 Points] DETAILS HARMATHAP12 10.5.001. 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

A function and its graph are given. Use the graph to find each of the following, if they exist. Then confirm your results analytically.

$$f(x) = \frac{x - 5}{x - 4}$$



(a) vertical asymptotes (Enter your answers as a comma-separated list of equations.)

(b) $\lim_{x \to \infty} f(x)$

(c) $\lim_{x \to -\infty} f(x)$

(d) horizontal asymptotes (Enter your answers as a comma-separated list of equations.)

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12. **[-/6.66 Points]** DETAILS **HARMATHAP12 10.5.007.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

Find any horizontal and vertical asymptotes for the function. (Enter your answers as a comma-separated list of equations. If an answer does not exist, enter DNE.)

$$y = \frac{x + 1}{x^2 - 9}$$

horizontal asymptotes

vertical asymptotes

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13. [-/6.66 Points] DETAILS HARMATHAP12 10.5.013. 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

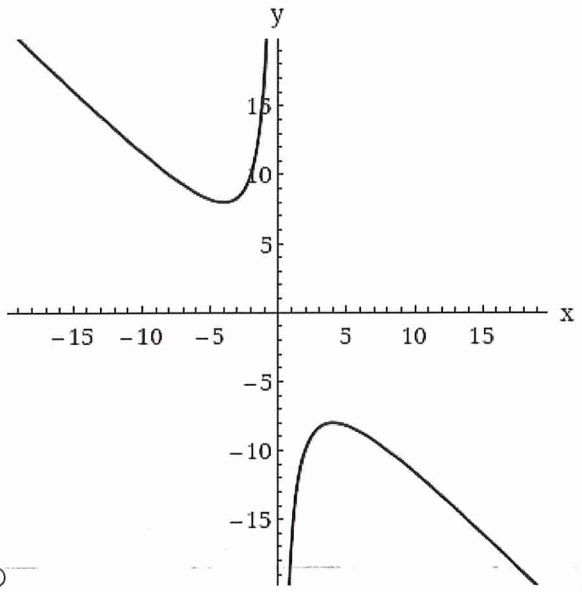
For the function, find any horizontal and vertical asymptotes. (Enter your answers as a comma-separated list of equations. If an answer does not exist, enter DNE.)

$$y = \frac{x^2 + 16}{x}$$

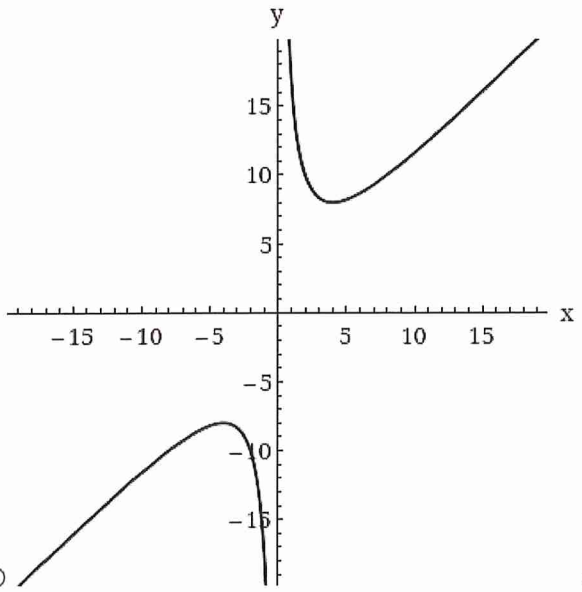
horizontal asymptotes

vertical asymptotes

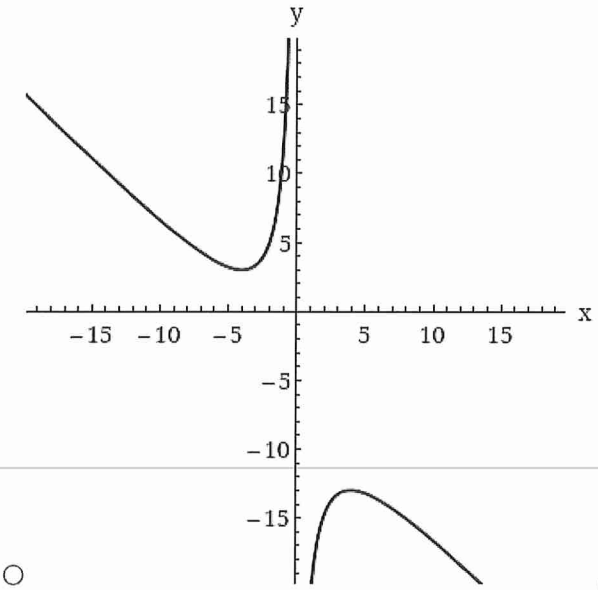
Use information from the first derivative to sketch the graph.

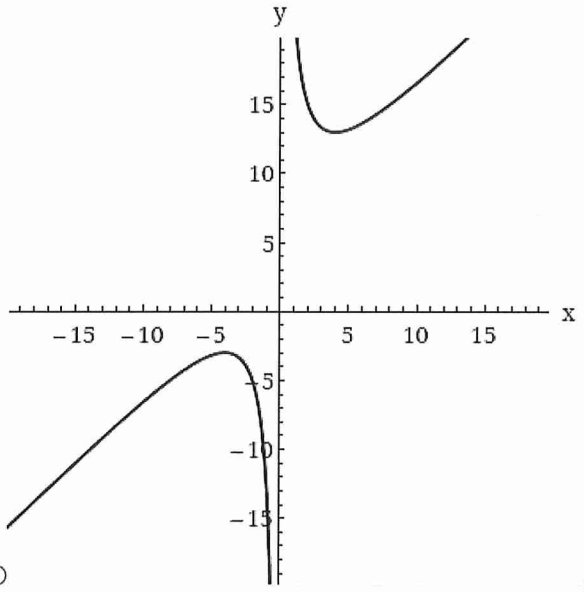


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14. [-/6.66 Points] DETAILS HARMATHAP12 10.5.023.MI. 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

A function and its first and second derivatives are given. Use these to find each of the following. (If an answer does not exist, enter DNE.)

$$f(x) = \frac{18(x-2)^{2/3}}{x^2}$$

$$f'(x) = \frac{24(3-x)}{x^3(x-2)^{1/3}}$$

$$f''(x) = \frac{8(7x^2-42x+54)}{x^4(x-2)^{4/3}}$$

Find any horizontal and vertical asymptotes. (Enter your answers as a comma-separated list of equations.)

horizontal asymptotes

vertical asymptotes

Find any critical points.

$(x, y) =$ (

) (smaller x-value)

$(x, y) =$ (

) (larger x-value)

Find any relative maxima and relative minima.

relative maximum $(x, y) =$ (

)

relative minimum $(x, y) =$ (

)

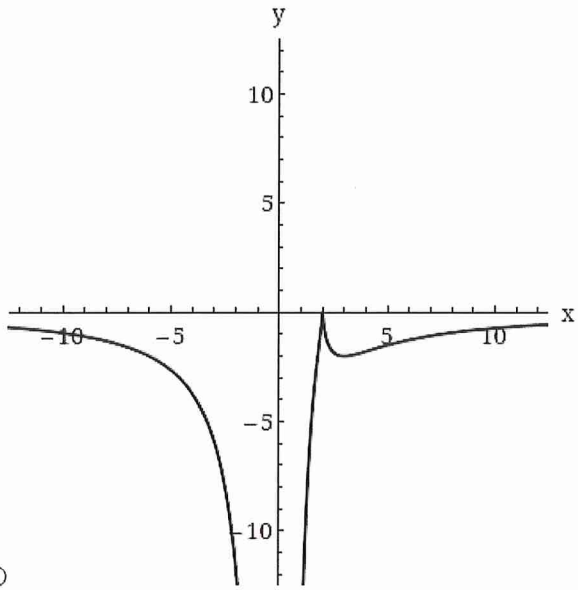
$(x, y) =$

) (smaller x-value)

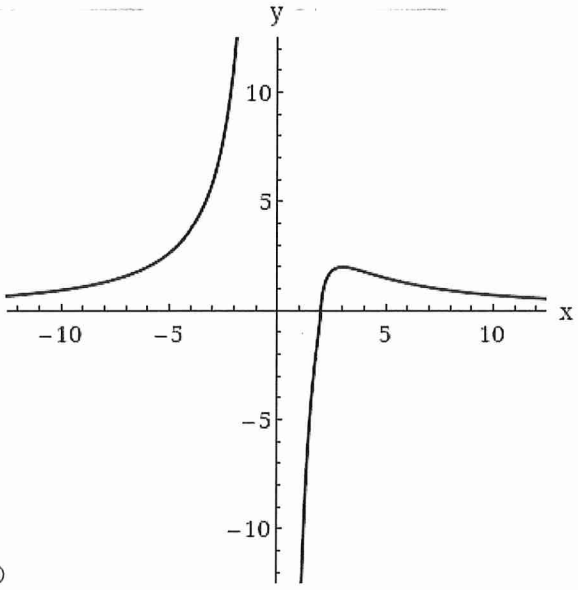
$(x, y) =$

) (larger x-value)

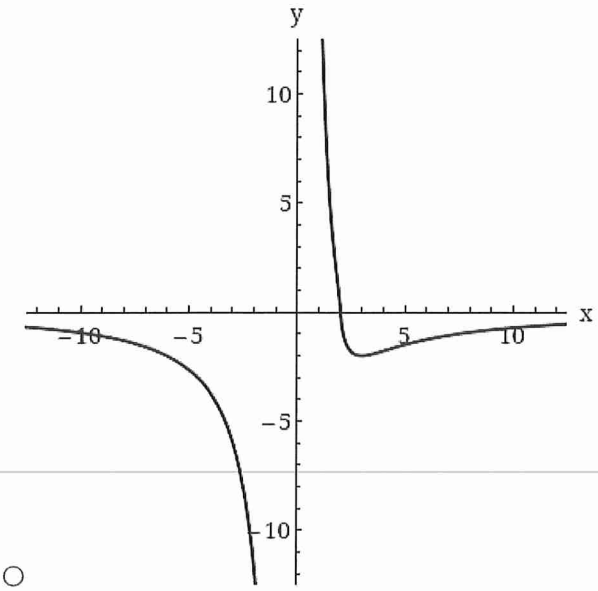
Sketch the graph of the function.

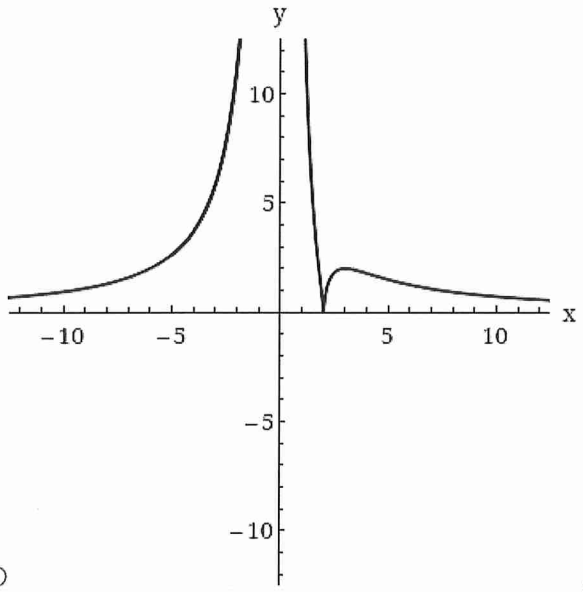


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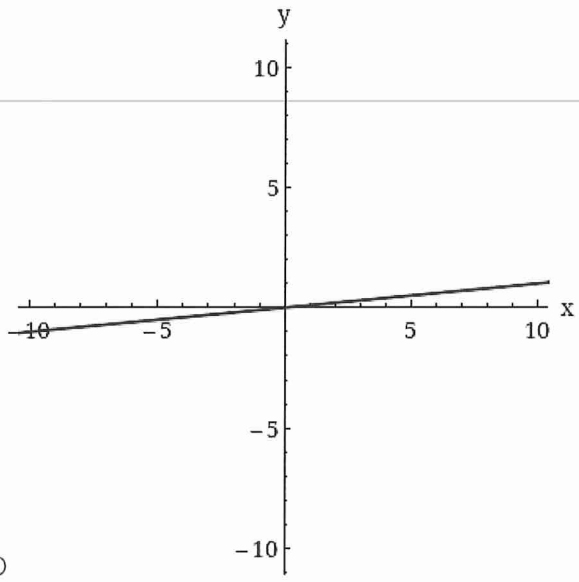
15. **[-/6.76 Points]** DETAILS **HARMATHAP12 10.5.030.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

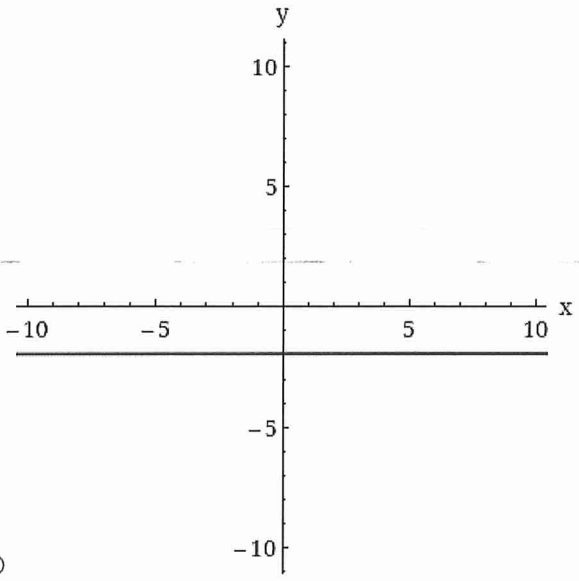
For the function, complete the following steps.

$$f(x) = \frac{x - 55}{x^2 + 1200}$$

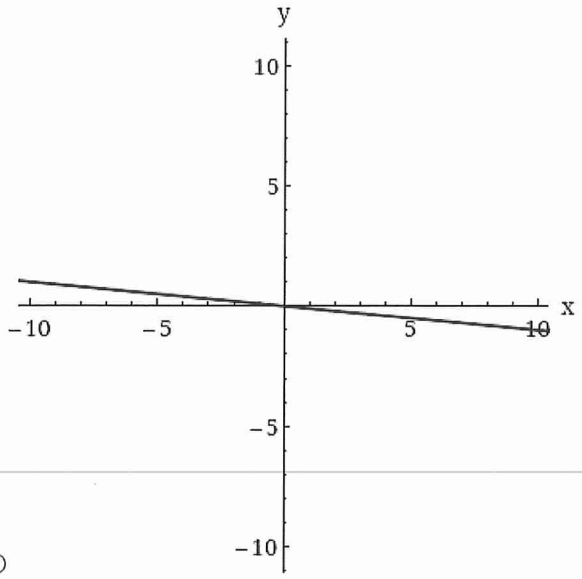
(a) Use a graphing calculator to graph the function in the standard viewing window.



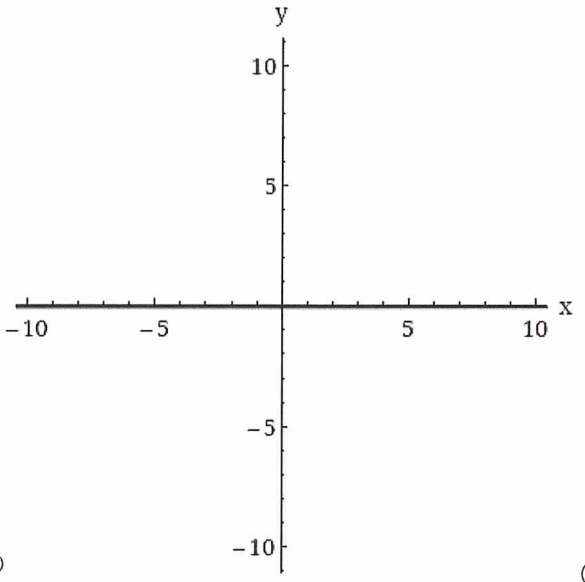
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(b) Analytically determine the location of any asymptotes. (Enter your answers as a comma-separated list of equations. If an answer does not exist, enter DNE.)

vertical asymptotes

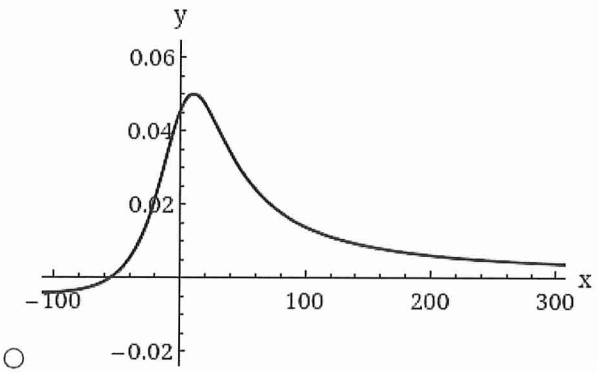
horizontal asymptotes

Analytically determine the location of any extrema. (If an answer does not exist, enter DNE.)

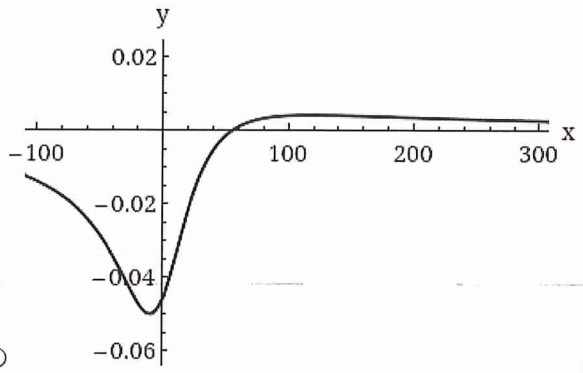
relative maximum $(x, y) =$ ( )

relative minimum $(x, y) =$ ( )

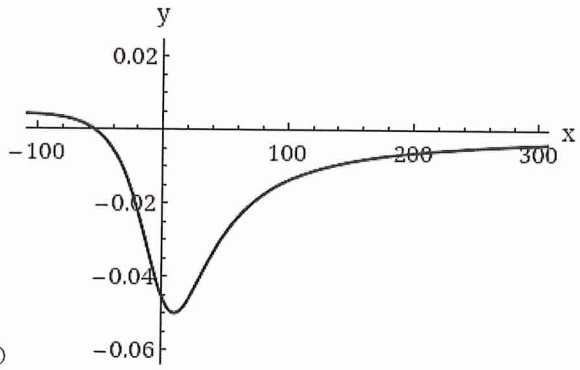
(c) Graph the function in a viewing window that shows all features of the graph.

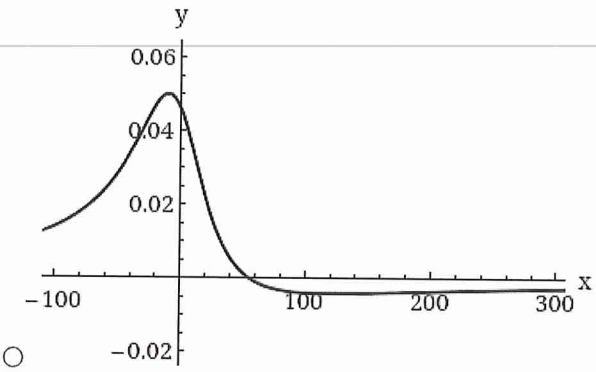


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