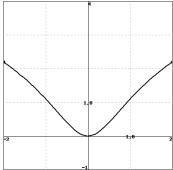
1. (1 pt) Use a graph below of $f(x) = \ln(2x^2 + 1)$ to estimate the *x*-values of any critical points and inflection points of f(x).



critical points (enter as a comma-separated list): x =

inflection points (enter as a comma-separated list): x =

Next, use derivatives to find the *x*-values of any critical points and inflection points exactly.

critical points (enter as a comma-separated list): x =

inflection points (enter as a comma-separated list): x =

Answer(s) submitted:

•

• (incorrect)

2. (1 pt) Find the inflection points of $f(x) = 4x^4 + 54x^3 - 42x^2 + 1$. (Give your answers as a comma separated list, e.g., 3,-2.)

inflection points = ______ Answer(s) submitted:

(incorrect)

3. (2 pts) The following table gives values of the differentiable function y = f(x).

х	0	1	2	3	4	5	6	7	8	9	10
у	-3	-4	-5	-7	-6	2	1	-1	-3	-1	1

Estimate the x-values of critical points of f(x) on the interval 0 < x < 10. Classify each critical point as a local maximum, local minimum, or neither.

(Enter your critical points as comma-separated xvalue, classification pairs. For example, if you found the critical points x = -2 and x = 3, and that the first was a local minimum and the second neither a minimum nor a maximum,

you should enter (-2,min), (3,neither). Enter none if there are no critical points.)

critical points and classifications: _

Now assume that the table gives values of the continuous function y = f'(x) (instead of f(x)). Estimate and classify critical points of the function f(x).

critical points and classifications: ____

Answer(s) submitted:

•

(incorrect)

4. (2 pts) Find constants a and b in the function $f(x) = axe^{bx}$ such that $f(\frac{1}{3}) = 1$ and the function has a local maximum at $x = \frac{1}{2}$.

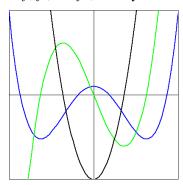
$$a = \underline{\hspace{1cm}}$$

Answer(s) submitted:

•

(incorrect)

5. (1 pt) The following shows graphs of three functions, A (in black), B (in blue), and C (in green). If these are the graphs of three functions f, f', and f'', identify which is which.



(Click on the graph to get a larger version.)

(For each enter A, B or C).

$$f = \underline{\hspace{1cm}}; f' = \underline{\hspace{1cm}}; f'' = \underline{\hspace{1cm}}$$
Answer(s) submitted:

•

(incorrect)

1

6. (4 pts) Please answer the following questions about the function

$$f(x) = \frac{3x^2}{x^2 + 25}.$$

Instructions: If you are asked to find a function, enter a function. If you are asked to find x- or y-values, enter either a number, a list of numbers separated by commas, or None if there aren't any solutions. Use **interval notation** if you are asked to find an interval or union of intervals, and enter $\{\}$ if the interval is empty.

(a) Calculate the first derivative of f. Find the critical numbers of f, where it is increasing and decreasing, and its local extrema.

(b) Calculate the second derivative of f. Find where f is concave up, concave down, and has inflection points.

f''(x) = ______

Concave up on the interval ______

Concave down on the interval ______

Inflection points x = ______

(c) Find any horizontal and vertical asymptotes of f. Horizontal asymptotes $y = \underline{\hspace{1cm}}$ Vertical asymptotes $x = \underline{\hspace{1cm}}$

(d) The function f is ? because ? for all x in the domain of f, and therefore its graph is symmetric about the ?

(e) Sketch a graph of the function f without having a graphing calculator do it for you. Plot the y-intercept and the x-intercepts, if they are known. Draw dashed lines for horizontal and vertical asymptotes. Plot the points where f has local maxima, local minima, and inflection points. Use what you know from parts (a) and (b) to sketch the remaining parts of the graph of f. Use any symmetry from part (d) to your advantage. Sketching graphs is an important skill that takes practice, and you may be asked to do it on quizzes or exams.

Answer(s) submitted:

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(incorrect)

7. (2 pts) Consider the function $f(x) = 6x + 8x^{-1}$. For this function there are four important intervals: $(-\infty, A]$, [A,B),(B,C), and $[C,\infty)$ where A, and C are the critical numbers and the function is not defined at B.

Find *A* _____ and *B* _____ and *C* _____

For each of the following intervals, tell whether f(x) is increasing (type in INC) or decreasing (type in DEC).

Answer(s) submitted:

•

(incorrect)

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