Assignment Previewer

Homework 7 (17778672)

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1. Question Details — LarCalcET7 4.2.042. [4057095]

Consider the graph of the function $f(x) = x^2 - x - 30$.

(a) Find the equation of the secant line joining the points $(-4, -10)$, and $(6, 0)$.

$x - y - 6 = 0$

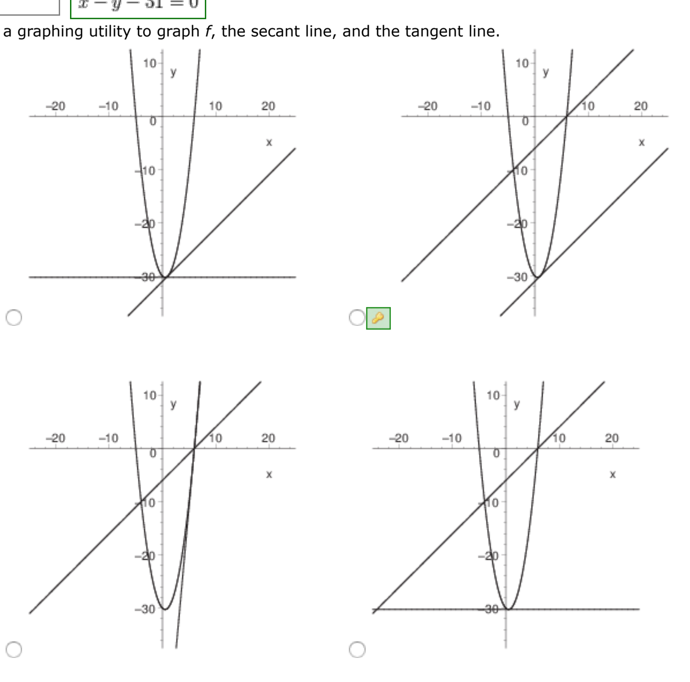
(b) Use the Mean Value Theorem to determine a point c in the interval $(-4, 6)$ such that the tangent line at c is parallel to the secant line.

$c =$ 1

(c) Find the equation of the tangent line through c.

$x - y - 31 = 0$

(d) Use a graphing utility to graph f, the secant line, and the tangent line.



2. Question Details — LarCalcET7 4.2.043.EP. [4497281]

Consider the following function and closed interval.

$f(x) = 5x^3, \quad [1, 2]$

Is f continuous on the closed interval $[1, 2]$?

- Yes
- No

If f is differentiable on the open interval $(1, 2)$, find $f'(x)$. (If it is not differentiable on the open interval, enter DNE.)

$f'(x) =$ $15x^2$

Find $f(1)$ and $f(2)$.

$f(1) =$ 5

$f(2) =$ 40

Find $\frac{f(b) - f(a)}{b - a}$ for $[a, b] = [1, 2]$.

$\frac{f(b) - f(a)}{b - a} =$ 35

Determine whether the Mean Value Theorem can be applied to f on the closed interval $[a, b]$. (Select all that apply.)

- Yes, the Mean Value Theorem can be applied.
- No, because f is not continuous on the closed interval $[a, b]$.
- No, because f is not differentiable in the open interval (a, b).
- None of the above.

If the Mean Value Theorem can be applied, find all values of c in the open interval (a, b) such that $f'(c) = \frac{f(b) - f(a)}{b - a}$. If the Mean Value Theorem cannot be applied, explain why not. (Enter your answers as a comma-separated list. If the Mean Value Theorem cannot be applied, enter NA.)

$c =$ $\sqrt{\frac{7}{3}}$

3. Question Details — LarCalcET7 4.2.047. [4056927]

Determine whether the Mean Value theorem can be applied to f on the closed interval $[a, b]$. (Select all that apply.)

$f(x) = \frac{x + 3}{x - 2}, \quad [-7, 7]$

- Yes, the Mean Value Theorem can be applied.
- No, f is not continuous on $[a, b]$.
- No, f is not differentiable on (a, b).
- None of the above.

If the Mean Value Theorem can be applied, find all values of c in the open interval (a, b) such that $f'(c) = \frac{f(b) - f(a)}{b - a}$. (Enter your answers as a comma-separated list. If the Mean Value Theorem cannot be applied, enter NA.)

$c =$ NA

4. Question Details — LarCalcET7 4.2.048. [4059514]

Determine whether the Mean Value Theorem can be applied to f on the closed interval $[a, b]$. (Select all that apply.)

$f(x) = \frac{x}{x - 26}, \quad [1, 25]$

- Yes, the Mean Value Theorem can be applied.
- No, f is not continuous on $[a, b]$.
- No, f is not differentiable on (a, b).
- None of the above.

If the Mean Value Theorem can be applied, find all values of c in the open interval (a, b) such that $f'(c) = \frac{f(b) - f(a)}{b - a}$. (Enter your answers as a comma-separated list. If the Mean Value Theorem cannot be applied, enter NA.)

$c =$ 21

5. Question Details — LarCalcET7 4.3.027. [4056418]

Consider the following function.

$f(x) = -8x^3 + 24x + 7$

(a) Find the critical numbers of f. (Enter your answers as a comma-separated list.)

$x =$ $-1, 1$

(b) Find the open intervals on which the function is increasing or decreasing. (Enter your answers using interval notation. If an answer does not exist, enter DNE.)

increasing $(-1, 1)$

decreasing $(-\infty, -1), (1, \infty)$

(c) Apply the First Derivative Test to identify the relative extremum. (If an answer does not exist, enter DNE.)

relative maximum $(x, y) = (1, 23)$

relative minimum $(x, y) = (-1, -9)$

6. Question Details — LarCalcET7 4.3.030. [4056946]

Consider the following function.

$f(x) = (8 - x)(x + 1)^2$

(a) Find the critical numbers of f. (Enter your answers as a comma-separated list.)

$x =$ $-1, 5$

(b) Find the open intervals on which the function is increasing or decreasing. (Enter your answers using interval notation. If an answer does not exist, enter DNE.)

increasing $(-1, 5)$

decreasing $(-\infty, -1), (5, \infty)$

(c) Apply the First Derivative Test to identify the relative extremum. (If an answer does not exist, enter DNE.)

relative maximum $(x, y) = (5, 108)$

relative minimum $(x, y) = (-1, 0)$

7. Question Details — LarCalcET7 4.3.041. [4056982]

Consider the following function.

$f(x) = \frac{x^2}{x^2 - 81}$

(a) Find the critical numbers of f. (Enter your answers as a comma-separated list.)

$x =$ 0

(b) Find the open intervals on which the function is increasing or decreasing. (Enter your answers using interval notation. If an answer does not exist, enter DNE.)

increasing $(-\infty, -9), (-9, 0)$

decreasing $(0, 9), (9, \infty)$

(c) Apply the First Derivative Test to identify the relative extremum. (If an answer does not exist, enter DNE.)

relative maximum $(x, y) = (0, 0)$

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

8. Question Details — LarCalcET7 4.3.046. [4059284]

Consider the following function.

$f(x) = (x - 6)e^x$

(a) Find the critical numbers of f. (Enter your answers as a comma-separated list.)

$x =$ 5

(b) Find the open intervals on which the function is increasing or decreasing. (Enter your answers using interval notation. If an answer does not exist, enter DNE.)

increasing $(5, \infty)$

decreasing $(-\infty, 5)$

(c) Apply the First Derivative Test to identify all relative extrema. (If an answer does not exist, enter DNE.)

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

relative minimum $(x, y) = (5, -e^5)$

9. Question Details — LarCalcET7 4.4.003. [4056285]

Determine the open intervals on which the graph is concave upward or concave downward. (Enter your answers using interval notation. If an answer does not exist, enter DNE.)

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

concave upward $(-\infty, \infty)$

concave downward DNE

10. Question Details — LarCalcET7 4.4.004. [4057073]

Determine the open intervals on which the graph is concave upward or concave downward. (Enter your answers using interval notation. If an answer does not exist, enter DNE.)

$g(x) = 6x^2 - x^3$

concave upward $(-\infty, 2)$

concave downward $(2, \infty)$

11. Question Details — LarCalcET7 4.4.011. [4056309]

Determine the open intervals on which the graph is concave upward or concave downward. (Enter your answers using interval notation. If an answer does not exist, enter DNE.)

$f(x) = \frac{x^2 + 1}{x^2 - 4}$

concave upward $(-\infty, -2), (2, \infty)$

concave downward $(-2, 2)$

12. Question Details — LarCalcET7 4.4.017. [4056803]

Find the point of inflection of the graph of the function. (If an answer does not exist, enter DNE.)

$f(x) = 2 - 3x^4$

$(x, y) =$ (DNE)

Describe the concavity. (Enter your answers using interval notation. If an answer does not exist, enter DNE.)

concave upward DNE

concave downward $(-\infty, 0), (0, \infty)$

13. Question Details — LarCalcET7 4.4.019. [4101573]

Find the points of inflection of the graph of the function. (Order your answers from smallest to largest x, then from smallest to largest y. If an answer does not exist, enter DNE.)

$f(x) = x(x - 10)^3$

$(x, y) = (5, -625)$

$(x, y) = (10, 0)$

Describe the concavity. (Enter your answer using interval notation. If an answer does not exist, enter DNE.)

concave upward $(-\infty, 5), (10, \infty)$

concave downward $(5, 10)$

14. Question Details — LarCalcET7 4.6.012. [4056368]

Analyze and sketch a graph of the function. Find any intercepts, relative extrema, points of inflection, and asymptotes. (If an answer does not exist, enter DNE.)

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

intercept $(x, y) = \left(0, -\frac{1}{8}\right)$

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

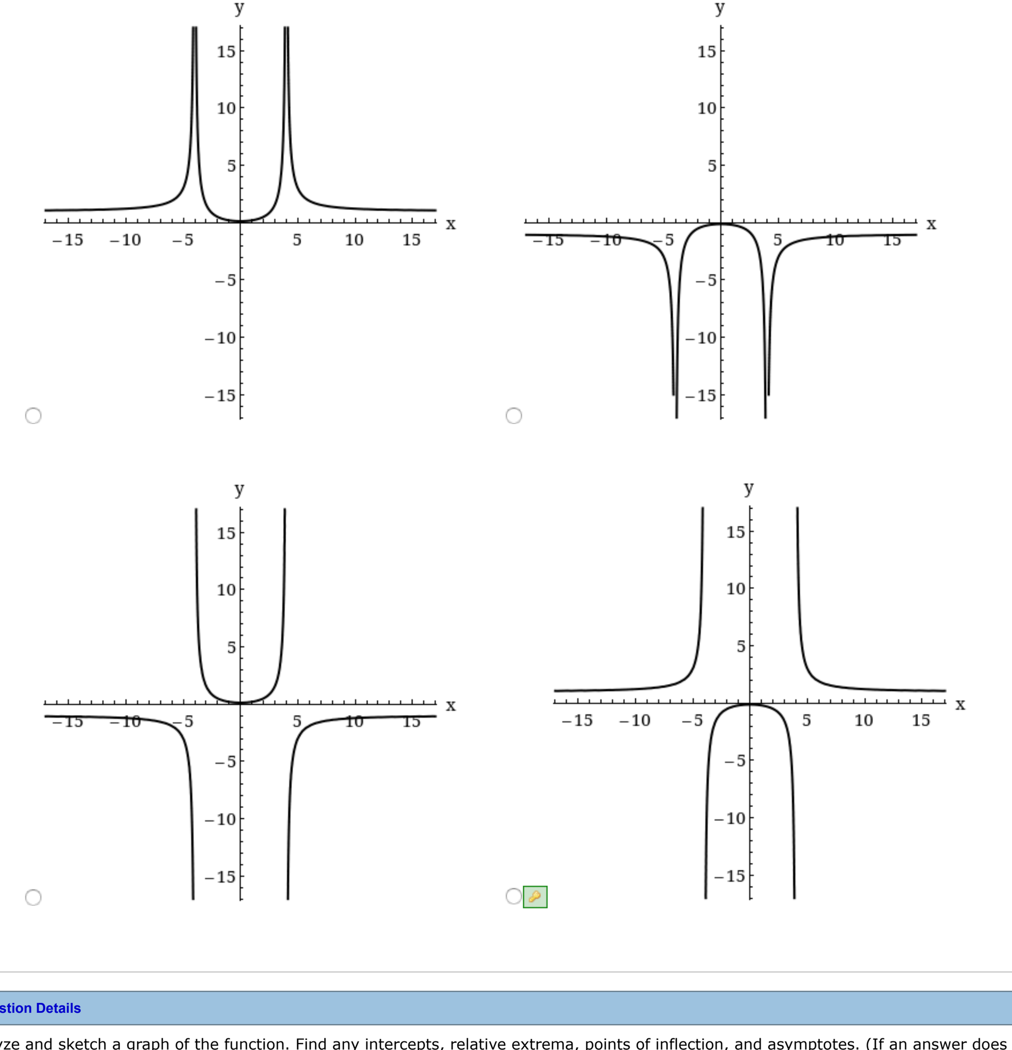
relative maximum $(x, y) = \left(0, -\frac{1}{8}\right)$

point of inflection $(x, y) =$ (DNE)

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

$y = 1, x = -4, x = 4$

Use a graphing utility to verify your results.



15. Question Details — LarCalcET7 4.6.018. [4056728]

Analyze and sketch a graph of the function. Find any intercepts, relative extrema, points of inflection, and asymptotes. (If an answer does not exist, enter DNE.)

$f(x) = \frac{x^3}{x^2 - 49}$

intercept $(x, y) = (0, 0)$

relative minimum $(x, y) = \left(7\sqrt{3}, \frac{21\sqrt{3}}{2}\right)$

relative maximum $(x, y) = \left(-7\sqrt{3}, -\frac{21\sqrt{3}}{2}\right)$

point of inflection $(x, y) = (0, 0)$

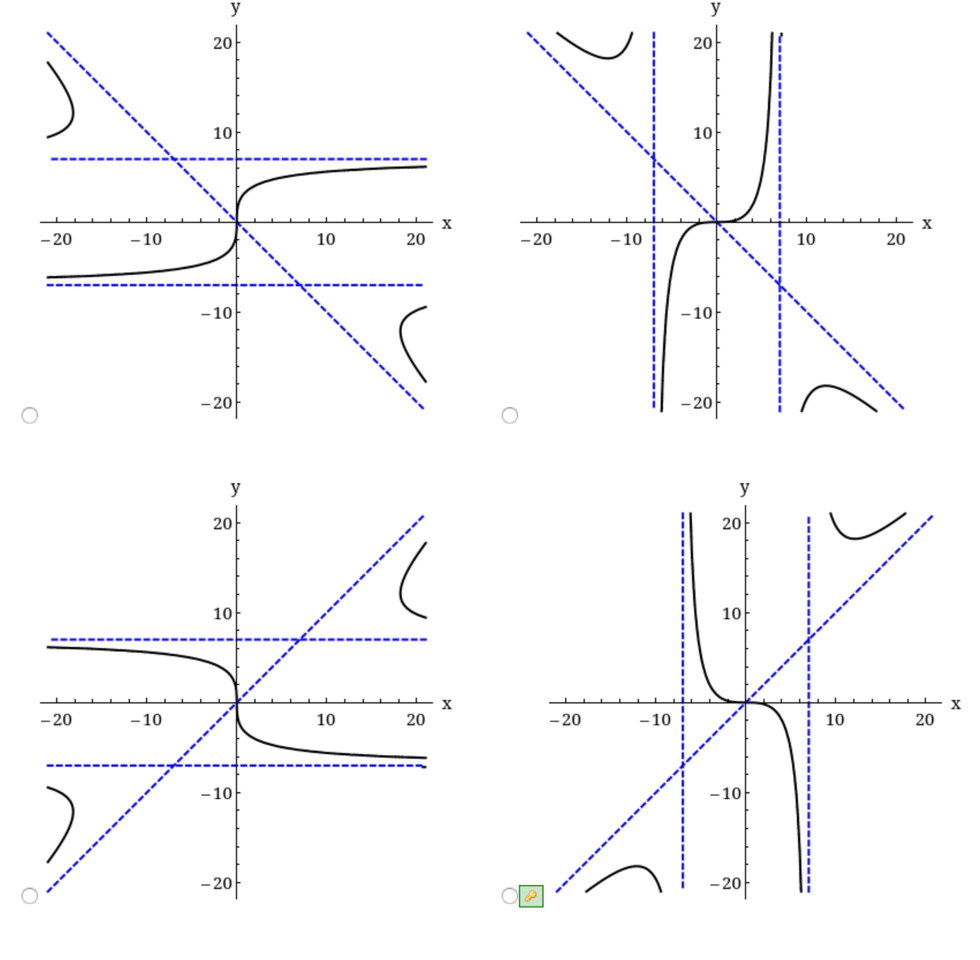
Find the equations of the asymptotes.

$x = -7$ (smaller x-value)

$x = 7$ (larger x-value)

$y = x$ (slant asymptote)

Use a graphing utility to verify your results.



16. Question Details — LarCalcET7 4.6.029. [4056390]

Analyze and sketch a graph of the function. Find any intercepts, relative extrema, points of inflection, and asymptotes. (If an answer does not exist, enter DNE.)

$y = 3x^4 + 4x^3$

intercept $(x, y) = \left(-\frac{4}{3}, 0\right)$ (smaller x-value)

$(x, y) = (0, 0)$ (larger x-value)

relative minimum $(x, y) = (-1, -1)$

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

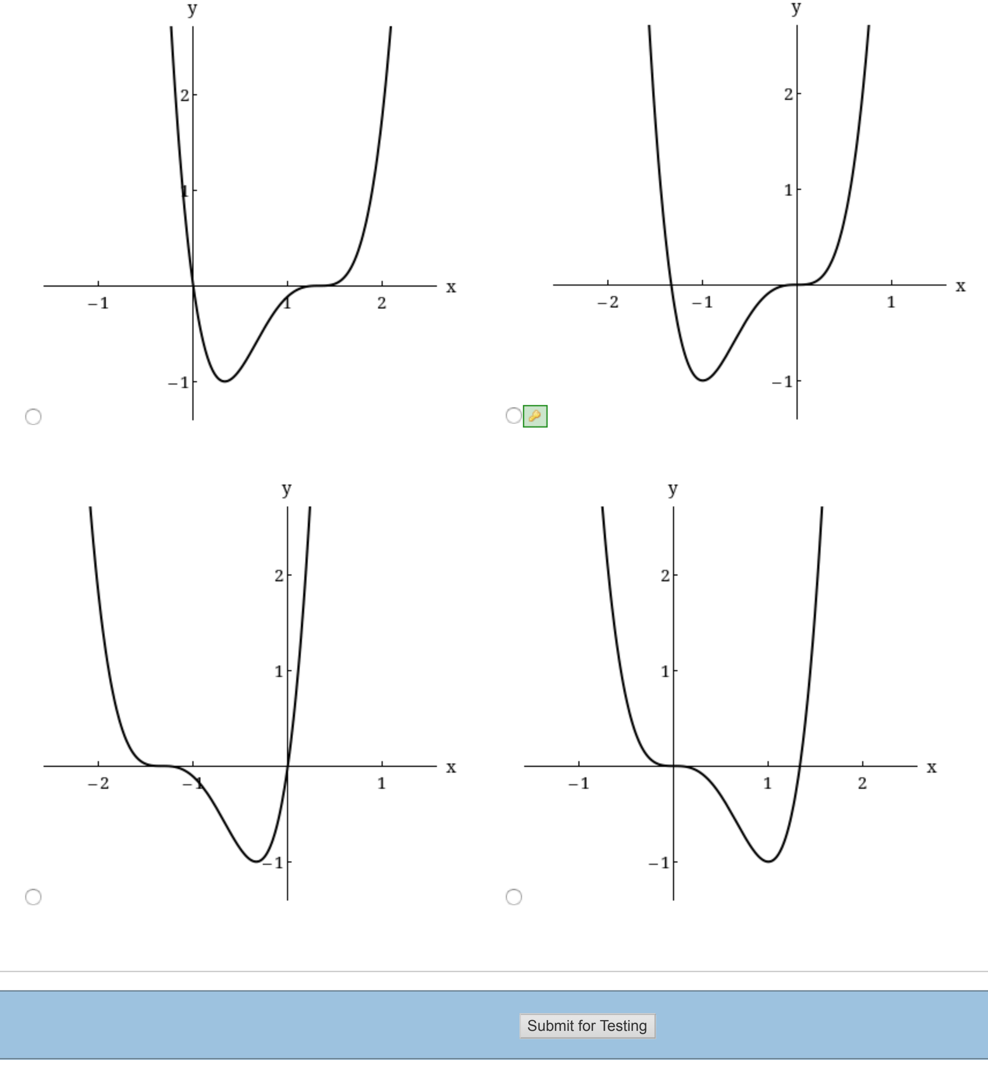
points of inflection $(x, y) = \left(-\frac{2}{3}, -\frac{16}{27}\right)$ (smaller x-value)

$(x, y) = (0, 0)$ (larger x-value)

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

DNE

Use a graphing utility to verify your results.



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