

1. (1 point) set7/c3s4p3.pg

Answer the following questions for the function

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

defined on the interval $[-19, 16]$.

Enter points, such as inflection points in ascending order, i.e. smallest x values first.

Enter intervals in ascending order also.

- A. The function $f(x)$ has vertical asymptotes at _____ and _____
- B. $f(x)$ is concave up on the region _____ to _____ and _____ to _____
- C. The inflection points for this function are _____, _____ and _____

Answer(s) submitted:

-
-
-
-
-
-
-
-
-
-

(incorrect)

Correct Answers:

- -1
- 1
- -1
- 0
- 1
- 16
- -1
- 0
- 1

2. (1 point) set7/c3s4p5.pg

Answer the following questions for the function

$$f(x) = \sin^2(x/5)$$

defined on the interval $[-15.607963, 3.12699075]$.

Enter points, such as inflection points in ascending order, i.e. smallest x values first.

Remember that you can enter "pi" for π as part of your answer.

- A. $f(x)$ is concave down on the region _____ to _____
- B. A global minimum for this function occurs at _____
- C. A local maximum for this function which is not a global maximum occurs at _____

- D. The function is increasing on _____ to _____ and on _____ to _____.

Answer(s) submitted:

-
-
-
-
-
-
-
-

(incorrect)

Correct Answers:

- -11.78097225
- -3.92699075
- 0
- 3.12699075
- -15.607963
- -7.8539815
- 0
- 3.12699075

3. (1 point) set7/s3_1_43a.pg

The function $f(x) = 6x + 6x^{-1}$ has one local minimum and one local maximum.

It is helpful to make a rough sketch of the graph to see what is happening.

This function has a local minimum at x equals _____ with value _____

and a local maximum at x equals _____ with value _____

Answer(s) submitted:

-
-
-
-

(incorrect)

Correct Answers:

- 1
- 12
- -1
- -12

4. (1 point) set7/s3_4_16a.pg

Consider the function $f(x) = 6(x-3)^{2/3}$. For this function there are two important intervals: $(-\infty, A)$ and (A, ∞) where A is a critical number.

Find A _____

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

$(-\infty, A)$: _____

(A, ∞) : _____

For each of the following intervals, tell whether $f(x)$ is concave up (type in CU) or concave down (type in CD).

$(-\infty, A)$: _____

(A, ∞) : _____

Answer(s) submitted:

-
-
-
-
-

(incorrect)

Correct Answers:

- 3
- DEC
- INC
- CD
- CD

5. (1 point) set7/s3_4_6a.pg

Consider the function $f(x) = 9x + 9x^{-1}$. 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).

$(-\infty, A]$: _____

$[A, B)$: _____

$(B, C]$: _____

$[C, \infty)$: _____

Note that this function has no inflection points, but we can still consider its concavity. For each of the following intervals, tell whether $f(x)$ is concave up (type in CU) or concave down (type in CD).

$(-\infty, B)$: _____

(B, ∞) : _____

Answer(s) submitted:

-
-
-
-
-
-
-
-
-

(incorrect)

Correct Answers:

- -1
- 0
- 1
- INC
- DEC
- DEC

- INC
- CD
- CU

6. (1 point) set7/s3_8_26.pg

A Norman window has the shape of a semicircle atop a rectangle so that the diameter of the semicircle is equal to the width of the rectangle. What is the area of the largest possible Norman window with a perimeter of 22 feet? _____

Answer(s) submitted:

-

(incorrect)

Correct Answers:

- 33.8859988044824

7. (1 point) set7/c3s2p1.pg

Consider the function

$$f(x) = -3x^3 - 2x^2 - 4x + 1$$

Find the average slope of this function on the interval $(-3, 5)$.

By the Mean Value Theorem, we know there exists a c in the open interval $(-3, 5)$ such that $f'(c)$ is equal to this mean slope. Find the two values of c in the interval which work, enter the smaller root first:

_____ \leq _____

Answer(s) submitted:

-
-
-

(incorrect)

Correct Answers:

- -65
- -2.83510578140108
- 2.39066133695663

8. (1 point) set7/s3_2_14.pg

Consider the function $f(x) = 6\sqrt{x} + 2$ on the interval $[4, 10]$. Find the average or mean slope of the function on this interval.

By the Mean Value Theorem, we know there exists a c in the open interval $(4, 10)$ such that $f'(c)$ is equal to this mean slope. For this problem, there is only one c that works. Find it.

Answer(s) submitted:

-
-

(incorrect)

Correct Answers:

- 1.16227766016838
- 6.66227766016838

9. (1 point) set7/golden-math1210fall2001-ps7-q9.pg

An object thrown from the edge of a 42-foot cliff follows the path given by $y = -\frac{2x^2}{25} + x + 42$. An observer stands 2.6656 feet from the bottom of the cliff.

- (a) Find the position of the object when it is closest to the observer.
(b) Find the position of the object when it is farthest from the observer.

Answers:

(a) (_____, _____).

(b) (_____, _____).

Answer(s) submitted:

-
-
-
-

(incorrect)

Correct Answers:

- 28
- 7.28
- 6.82666472614353
- 45.0983966234897

10. (1 point) set7/golden-math1210fall2001-ps7-q10.pg

The illumination at a point is inversely proportional to the square of the distance of the point from the light source and directly proportional to the intensity of the light source. If two light sources are s feet apart and their intensities are I and J respectively, at what point between them will the sum of their illuminations be a minimum?

Solution:

Let x be the distance from I at which the sum of the illuminations be minimum. Then

$x =$ _____.

Instruction: Give your answer in terms of s , I and J .

Answer(s) submitted:

-

(incorrect)

Correct Answers:

- $s * I^{**}(1/3) / (I^{**}(1/3) + J^{**}(1/3))$

11. (1 point) set7/golden-math1210fall2001-ps7-q11.pg

Find the equation of the line that is tangent to the ellipse $b^2x^2 + a^2y^2 = a^2b^2$ in the first quadrant and forms with the coordinate axes the triangle with smallest possible area (a and b are positive constants.)

The equation of the required line is:

____ x + ____ y + _____ = 0.

Answer(s) submitted:

-
-
-

(incorrect)

Correct Answers:

- b
- a
- $-a*b*\text{sqrt}(2)$

12. (1 point) set7/golden-math1210fall2001-ps7-q12.pg

Find the indicated limit. Make sure that you have an indeterminate form before you apply l'Hopital's Rule.

$$\lim_{x \rightarrow \pi/2} \frac{\cos x}{\frac{\pi}{2} - x} = \underline{\hspace{2cm}}.$$

Instruction: If your answer is ∞ , enter "Infinity"; if it is $-\infty$, enter "-Infinity".

Answer(s) submitted:

-

(incorrect)

Correct Answers:

- 1

13. (1 point) set7/golden-math1210fall2001-ps7-q13.pg

Find the indicated limit. Make sure that you have an indeterminate form before you apply l'Hopital's Rule.

$$\lim_{x \rightarrow 0} \frac{x^3 - 3x^2 + x}{x^3 - 2x} = \underline{\hspace{2cm}}.$$

Instruction: If your answer is ∞ , enter "Infinity"; if it is $-\infty$, enter "-Infinity".

Answer(s) submitted:

•

(incorrect)

Correct Answers:

• -0.5

14. (1 point) set7/golden-math1210fall2001-ps7-q14.pg

Find the indicated limit. Make sure that you have an indeterminate form before you apply l'Hopital's Rule.

$$\lim_{x \rightarrow 0} \frac{\sin x - \tan x}{x^2 \sin x} = \underline{\hspace{2cm}}.$$

Instruction: If your answer is ∞ , enter "Infinity"; if it is $-\infty$, enter "-Infinity".

Answer(s) submitted:

•

(incorrect)

Correct Answers:

• -0.5

15. (1 point) set7/golden-math1210fall2001-ps7-q15.pg

Find the indicated limit. Make sure that you have an indeterminate form before you apply l'Hopital's Rule.

$$\lim_{x \rightarrow 0^+} \frac{x^2}{\sin x - x} = \underline{\hspace{2cm}}.$$

Instruction: If your answer is ∞ , enter "Infinity"; if it is $-\infty$, enter "-Infinity".

Answer(s) submitted:

•

(incorrect)

Correct Answers:

• -Infinity

16. (1 point) set7/golden-math1210fall2001-ps7-q16.pg

Find

$$\lim_{x \rightarrow 0} \frac{x^2 \sin(1/x)}{\tan x} = \underline{\hspace{2cm}}.$$

Instruction: If your answer is ∞ , enter "Infinity"; if it is $-\infty$, enter "-Infinity".

Answer(s) submitted:

•

(incorrect)

Correct Answers:

• 0

17. (1 point) set7/golden-math1210fall2001-ps7-q17.pg

Use a CAS (Computer Algebra System) to evaluate the following limit:

$$\lim_{x \rightarrow 0} \frac{\cos x - 1 + x^2/2}{x^4} = \underline{\hspace{2cm}}.$$

Instruction: If your answer is ∞ , enter "Infinity"; if it is $-\infty$, enter "-Infinity".

Answer(s) submitted:

•

(incorrect)

Correct Answers:

• 0.0416666666666667