

Problem 1. 3. (1 pt) Use implicit differentiation to find the slope of the tangent line to the curve

$$2xy^3 + 5xy = 28$$

at the point (4,1).

$m =$ _____

Answer(s) submitted:

- - (7/44)

(correct)

Correct Answers:

- -0.159090909090909

Problem 2. 13. (1 pt) Consider the function

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

Find the average slope of this function on the interval (3,4).

By the Mean Value Theorem, we know there exists a c in the open interval (3,4) such that $f'(c)$ is equal to this mean slope. Find the value of c in the interval which works _____

Answer(s) submitted:

- -137
- 34/9

(incorrect)

Correct Answers:

- -119
- 3.51152008597802

Problem 3. 12. (1 pt) Use linear approximation, i.e. the tangent line, to approximate $\frac{1}{0.103}$ as follows: Let $f(x) = \frac{1}{x}$ and find the equation of the tangent line to $f(x)$ at a "nice" point near 0.103. Then use this to approximate $\frac{1}{0.103}$.

Answer(s) submitted:

- 9.7

(correct)

Correct Answers:

- 9.7

Problem 4. 5. (1 pt) Suppose $xy = 4$ and $\frac{dy}{dt} = 1$. Find $\frac{dx}{dt}$ when $x = 1$.

$$\frac{dx}{dt} =$$

Answer(s) submitted:

- -1/4

(correct)

Correct Answers:

- -0.25

Problem 5. 7. (1 pt) Find the most general antiderivative for the function $\left(7x^4 - \frac{5}{x^5} - 3\right)$.

Note: Don't enter the +C . It's included for you.

Antiderivative = _____ + C.

Answer(s) submitted:

- ((7x^5)/5) + (5/(4x^4)) - (3x)

(correct)

Correct Answers:

- 7*(x**5)/5 - 5*(x**(-5+1))/(-5+1) - 3*x

Problem 6. 2. (1 pt) Find an equation for the line tangent to the graph of

$$f(x) = \frac{\sqrt{x}}{3x+7}$$

at the point (2, f(2)).

y = _____

Answer(s) submitted:

- ((25sqrt(2))/(338)) + ((x(sqrt(2)))/(676))

(correct)

Correct Answers:

- sqrt(2)/(7+3*2) + 0.00209203189700162*(x-2)

Problem 7. 1. (1 pt) Suppose that $f(x) = 18e^x - ex^e$. Find $f'(3)$.

$$f'(3) =$$

Answer(s) submitted:

- ((18e^3) - (1/3)((3^e)(e^2)))

(correct)

Correct Answers:

- 312.739897915902

Problem 8. 4. (1 pt) Let $f(x) = 4x^2 \cos(7x)$.

Then $f'(x)$ is _____

and $f'(4)$ is _____

$f''(x)$ is _____

and $f''(4)$ is _____

Answer(s) submitted:

- $8x(\cos(7x)) - (28(x^2)(\sin(7x)))$
- $32(\cos(28)) - 448(\sin(28))$
- $(8 - 196(x^2))\cos(7x) - (112x(\sin(7x)))$
- $-3128(\cos(28)) - (448(\sin(28)))$

(correct)

Correct Answers:

- $2*4*x*\cos(7*x) - 4*(x**2)*\sin(7*x)*7$
- -152.169180883959
- $2*4*\cos(7*x) - 4*4*x*\sin(7*x)*7 - 4*(x**2)*\cos(7*x)*(7**2)$
- 2889.66535666691

Problem 9. 14. (1 pt) Suppose that

$$f(x) = 9x^2 - x^3 + 3.$$

(A) Find all critical numbers of f . If there are no critical numbers, enter 'NONE'.

Critical numbers = _____

(B) Use interval notation to indicate where $f(x)$ is increasing.

Note: Use 'INF' for ∞ , '-INF' for $-\infty$, and use 'U' for the union symbol.

Increasing: _____

(C) Use interval notation to indicate where $f(x)$ is decreasing.

Decreasing: _____

(D) List the x -coordinates of all local maxima of f . If there are no local maxima, enter 'NONE'.

x values of local maxima = _____

(E) List the x -coordinates of all local minima of f . If there are no local minima, enter 'NONE'.

x values of local minima = _____

(F) Use interval notation to indicate where $f(x)$ is concave up.

Concave up: _____

(G) Use interval notation to indicate where $f(x)$ is concave down.

Concave down: _____

(H) List the x values of all inflection points of f . If there are no inflection points, enter 'NONE'.

x values of inflection points = _____

(I) Use all of the preceding information to sketch a graph of f . When you're finished, enter a "1" in the box below.

Graph Complete: _____

Answer(s) submitted:

- 3, 9.03674

-
-
-
-
-
-
-
-

(incorrect)

Correct Answers:

- 0, 6
- (0, 6)
- $(-\infty, 0) \cup (6, \infty)$
- 6
- 0
- $(-\infty, 3)$
- $(3, \infty)$
- 3
- 1

Problem 10. 11. (1 pt) Let $y = 4x^2 + 5x + 4$.

Find the differential dy when $x = 2$ and $dx = 0.2$ _____

Find the differential dy when $x = 2$ and $dx = 0.4$ _____

Answer(s) submitted:

- 4.2
- 8.4

(correct)

Correct Answers:

- 4.2
- 8.4

Problem 11. 8. (1 pt) Find $\frac{dy}{dx}$ for the function $y = x^{\cos(x)}$.

$$\frac{dy}{dx} = \underline{\hspace{2cm}}$$

Answer(s) submitted:

- $(x^{\cos(x)})((1/x)\cos(x) - (\ln(x))\sin(x))$

(incorrect)

Correct Answers:

- $x^{\cos(x)} * (\cos(x)/x - \sin(x) * \ln(x))$

Problem 12. 6. (1 pt) Find the absolute maximum and absolute minimum values of the function

$$f(x) = x^3 + 12x^2 - 27x + 5$$

over each of the indicated intervals.

(a) Interval = $[-10, 0]$.

1. Absolute maximum = _____

2. Absolute minimum = _____

(b) Interval = $[-7, 2]$.

1. Absolute maximum = _____

2. Absolute minimum = _____

(c) Interval = $[-10, 2]$.

1. Absolute maximum = _____

2. Absolute minimum = _____

Answer(s) submitted:

-
-
-
-
-
-

(incorrect)

Correct Answers:

- 491
- 5
- 439
- -9
- 491
- -9

Problem 13. 9. (1 pt)

Evaluate the limit using L'Hospital's rule if necessary

$$\lim_{x \rightarrow 1} \frac{x^{15} - 1}{x^9 - 1}$$

Answer: _____

Answer(s) submitted:

- (15/9)

(correct)

Correct Answers:

- 15/9

Problem 14. 10. (1 pt) Find two positive numbers whose product is 100 and whose sum is a minimum.

Answer: _____, _____

Answer(s) submitted:

- 10
- 10

(correct)

Correct Answers:

- 10
- 10

Problem 15. 15. (1 pt) Find the x -coordinate of the absolute minimum for the function

$$f(x) = 2x \ln(x) - 7x, \quad x > 0.$$

x -coordinate of absolute minimum = _____

Answer(s) submitted:

-

(incorrect)

Correct Answers:

- 12.1824939607035