
Problem 1. 1. (1 pt) Suppose that $f(x) = 17e^x - ex^e$. Find $f'(3)$.

$f'(3) =$ ______

Answer(s) submitted:

- `(17(e^x) - ((e^2)(x^(e-1))))`

(incorrect)

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

$$f(x) = \frac{\sqrt{x}}{2x+6}$$

at the point $(1, f(1))$.

$y =$ ______

Answer(s) submitted:

- `(x/32) + (3/32)`

(correct)

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

$$2xy^3 + 3xy = 10$$

at the point $(2,1)$.

$m =$ ______

Answer(s) submitted:

- `-(5/18)`

(correct)

Problem 4. 4. (1 pt) Let $f(x) = 4x^2\cos(4x)$.
Then $f'(x)$ is ______
and $f'(3)$ is ______
$f''(x)$ is ______
and $f''(3)$ is ______

Answer(s) submitted:

- `8x(cos(4x) - 2xsin(4x))`
- `24(cos(12) - 6sin(12))`
- `-8((8x^2 - 1)(cos(4x)) + 8x(sin(4x)))`
- `-8(24sin(12) + 71cos(12))`

(correct)

Problem 5. 5. (1 pt) Suppose $xy = 1$ and $\frac{dy}{dt} = -1$. Find $\frac{dx}{dt}$ when $x = -3$.

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

Answer(s) submitted:

- `9`

(correct)

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

$$f(x) = x^3 + 12x^2 - 27x + 8$$

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:

- `494`
- `8`
- `442`
- `-6`
- `494`
- `-6`

(correct)

Problem 7. 7. (1 pt) Find the most general antiderivative for the function $\left(8x^4 - \frac{5}{x^3} - 3\right)$.
Note: Don't enter the **+C** . It's included for you.
Antiderivative = ______ $+C$.

Answer(s) submitted:

- `((8x^5)/5) + (5/(2x^2)) - (3x)`

(correct)

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

$\frac{dy}{dx} =$ ______

Answer(s) submitted:

- `(x^(cos(x) - 1))(cos(x) - x(ln(x))sin(x))`

(correct)

Problem 9. 9. (1 pt)
Evaluate the limit using L'Hospital's rule if necessary

$$\lim_{x \to 1} \frac{x^6 - 1}{x^{14} - 1}$$

Answer: ______

Answer(s) submitted:

- `(6/14)`

(correct)

Problem 10. 10. (1 pt) Find two positive numbers whose product is 81 and whose sum is a minimum.

Answer: ___, ___
Answer(s) submitted:

- `9`
- `9`

(correct)

Problem 11. 11. (1 pt) Let $y = 5x^2 + 8x + 2$.
Find the differential dy when $x = 5$ and $dx = 0.1$ ______
Find the differential dy when $x = 5$ and $dx = 0.2$ ______
Answer(s) submitted:

- `5.8`
- `11.6`

(correct)

Problem 12. 12. (1 pt) Use linear approximation, i.e. the tangent line, to approximate $\frac{1}{0.501}$ as follows: Let $f(x) = \frac{1}{x}$ and find the equation of the tangent line to $f(x)$ at a "nice" point near 0.501. Then use this to approximate $\frac{1}{0.501}$.

______

Answer(s) submitted:

- `-6.004`

(incorrect)

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

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

Find the average slope of this function on the interval $(4, 12)$. ______

By the Mean Value Theorem, we know there exists a c in the open interval $(4, 12)$ such that $f'(c)$ is equal to this mean slope. Find the value of c in the interval which works ___
Answer(s) submitted:

- `96`
- `(1/6)(2+sqrt(574))`

(incorrect)

Problem 14. 14. (1 pt) Suppose that

$$f(x) = 8x^2 - x^3 + 1.$$

(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:

- `0, (16/3)`
- `(0, (16/3))`
- `(-INF, 0) U ((16/3), INF)`
- `((16/3))`
- `0`
- `(-INF, (16/6))`
- `((16/6), INF)`
- `(16/6)`
- `1`

(correct)

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

$$f(x) = 3x\ln(x) - 7x, \qquad x > 0.$$

x-coordinate of absolute minimum = ___

Answer(s) submitted:

- `(e^(4/3))`

(correct)