← MAT2601_ONL8FA_ONL8F_21 - Calculus, Fall 2021

Test 1 MAT2601 (Test)

INSTRUCTOR
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Current Score

QUESTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Due Date

TUE, NOV 2, 2021
11:59 PM EDT

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Assignment Submission & Scoring

Assignment Submission

For this assignment, you submit answers by question parts. The number of submissions remaining for each question part only changes if you submit or change the answer.

Assignment Scoring

Your last submission is used for your score.

1. DETAILS HARMATHAP12 9.4.021.EP. MY NOTES ASK YOUR TEACHER

Find the derivative of each function.

$\frac{d}{dt}(3t^{11/3}) =$

$\frac{d}{dt}(-2t^{9/4}) =$

$\frac{d}{dt}(-t^{1/2}) =$

$\frac{d}{dt}(4) =$

Consider the following function.

$$z = 3t^{11/3} - 2t^{9/4} - t^{1/2} + 4$$

Find the derivative of the function.

$z' =$

2. DETAILS HARMATHAP12 10.3.006. MY NOTES ASK YOUR TEACHER

Find the absolute maxima and minima for $f(x)$ on the interval $[a, b]$.

$$f(x) = 3 + 3x^2 - x^3, \quad [-4, 10]$$

absolute minimum $(x, y) =$ (,)

absolute maximum $(x, y) =$ (,)

3. DETAILS HARMATHAP12 9.7.013. MY NOTES ASK YOUR TEACHER

Find the derivative of the function. Simplify and express the answer using positive exponents only.

$$y = \frac{4}{3}x^3(4x^5 - 13)^3$$

$y' =$

4. DETAILS HARMATHAP12 9.9.005. MY NOTES ASK YOUR TEACHER

Suppose that demand for local cable TV service is given by

$p = 124 - 0.4x$

where p is the monthly price per subscriber in dollars and x is the number of subscribers (in hundreds).

(a) Find the total revenue R (in hundreds of dollars) as a function of the number of subscribers (in hundreds).

$R(x) =$

(b) Find the number of subscribers (in hundreds) when the company charges $80 per month for cable service.

[ ] hundred subscribers

Find the total revenue (in hundreds of dollars) for $p = \$80$.

[ ] hundred dollars

(c) How could the company attract more subscribers?

More subscribers are attracted by ---Select--- prices.

(d) Find the marginal revenue (in hundreds of dollars per hundred subscribers) when the price is $80 per month.

[ ] hundred dollars per hundred subscribers

Interpret this value.

For the number of subscribers associated with a price of $80 per month, as the number of subscribers (in hundreds) increases by 1, the revenue ---Select--- by [ ] (100) = $ [ ].

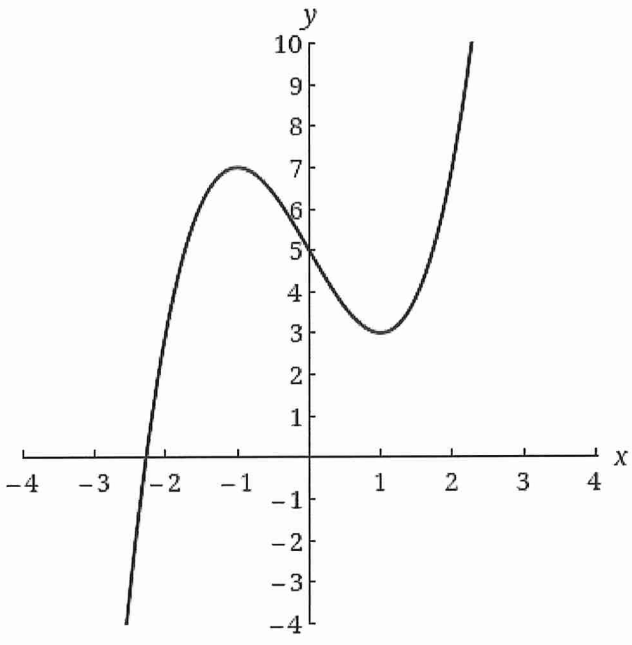
What does the marginal revenue suggest about the monthly charge to subscribers?

- ○ The revenue can be increased by lowering the monthly charges.
- ○ The revenue can be increased by raising the monthly charges.

5. DETAILS HARMATHAP12 10.1.011. MY NOTES ASK YOUR TEACHER

Consider the following.

$y = x^3 - 3x + 5$



(a) Estimate the coordinates of the relative maxima, relative minima, or horizontal points of inflection by observing the graph. (If an answer does not exist, enter DNE.)

relative maxima $(x, y) =$ ( ) ( )

relative minima $(x, y) =$ ( ) ( )

horizontal points of inflection $(x, y) =$ ( )

(b) Use $y' = f'(x)$ to find the critical values. (Enter your answers as a comma-separated list.)

$x =$

(c) Find the critical points. (Order your answers from smallest to largest x, then from smallest to largest y.)

$(x, y) =$

$(x, y) =$

---

6. DETAILS HARMATHAP12 9.5.017.MI. MY NOTES ASK YOUR TEACHER

Find the indicated derivative.

$$\frac{dp}{dq} \text{ for } p = \frac{4\sqrt[4]{q}}{1 - q}$$

$\frac{dp}{dq} =$

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7. DETAILS HARMATHAP12 9.6.016. MY NOTES ASK YOUR TEACHER

Differentiate the function.

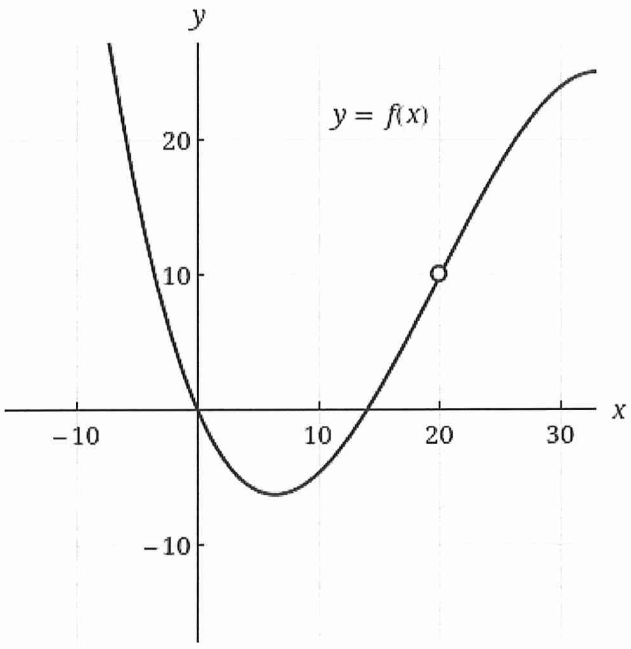
$$y = \sqrt{x^2 + 6x}$$

$y' =$

8. DETAILS HARMATHAP12 9.1.004. MY NOTES ASK YOUR TEACHER

A graph of $y = f(x)$ is shown and a c-value is given. Use the graph to find the following, whenever they exist. (If the limit is infinite, enter '∞' or '-∞', as appropriate. If the limit does not otherwise exist, enter DNE.)

$c = 20$



(a) $\lim_{x \to c} f(x)$

(b) $f(c)$

9. DETAILS HARMATHAP12 9.5.008. MY NOTES ASK YOUR TEACHER

Find the derivative, but do not simplify your answer.

$$y = (x^2 + x + 3)\left(\sqrt[3]{x} - 2\sqrt{x} + 7\right)$$

$y' =$

10. DETAILS HARMATHAP12 9.3.009. MY NOTES ASK YOUR TEACHER

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

(a) Use the definition of derivative and the Procedure/Example box in this section to find the derivative.
$f'(x) =$

(b) Find the instantaneous rate of change of $f(x)$ at $x = -1$.

(c) Find the slope of the tangent to the graph of $y = f(x)$ at $x = -1$.

(d) Find the point on the graph of $y = f(x)$ at $x = -1$.
$(x, y) = ($)

11. DETAILS HARMATHAP12 9.3.029. MY NOTES ASK YOUR TEACHER

If the instantaneous rate of change of $f(x)$ at $(4, -6)$ is 5, write the equation of the line tangent to the graph of $f(x)$ at $x = 4$. (Let x be the independent variable and y be the dependent variable.)

12. DETAILS HARMATHAP12 10.4.015.MI. MY NOTES ASK YOUR TEACHER

Two equal rectangular lots are enclosed by fencing the perimeter of a rectangular lot and then putting a fence across its middle. If each lot is to contain 2,700 square feet, what is the minimum amount of fence (in ft) needed to enclose the lots (include the fence across the middle)?

ft

13. DETAILS HARMATHAP12 10.3.007.MI. MY NOTES ASK YOUR TEACHER

Consider the following total revenue function for a hammer.

$R = 52x - 0.01x^2$

(a) The sale of how many hammers, x, will maximize the total revenue in dollars?

$x =$ ☐ hammers

Find the maximum revenue.

$ ☐

(b) Find the maximum revenue if production is limited to at most 1000 hammers.

$ ☐

14. DETAILS HARMATHAP12 9.6.035.MI. MY NOTES ASK YOUR TEACHER

Ballistics experts are able to identify the weapon that fired a certain bullet by studying the markings on the bullet. Tests are conducted by firing into a bale of paper. If the distance s, in inches, that the bullet travels into the paper is given by

$$s = 125 - (5 - 10t)^3$$

for $0 \le t \le 0.5$ second, where t is the time in seconds after the bullet hits the paper, find the velocity of the bullet one-tenth of a second after it hits the paper.

☐ ft/sec

15. DETAILS HARMATHAP12 9.2.005.EP. MY NOTES ASK YOUR TEACHER

Consider the following function.

$$f(x) = \frac{x^2 - x - 20}{x^2 + 4x}$$

Find each value. (If an answer does not exist, enter DNE.)

$f(-4) =$ ☐

$\lim_{x \to -4} f(x) =$ ☐

Determine whether the function is continuous or discontinuous at $x = -4$. Examine the three conditions in the definition of continuity.

- ○ The function is continuous at $x = -4$.
- ○ The function is discontinuous at $x = -4$.

16. DETAILS HARMATHAP12 9.7.029. MY NOTES ASK YOUR TEACHER

Find the derivative of the function. Simplify and express the answer using positive exponents only.

$$y = x^2 \sqrt[4]{4x - 9}$$

$y' =$

17. DETAILS HARMATHAP12 10.5.005.MI. MY NOTES ASK YOUR TEACHER

Find any horizontal and vertical asymptotes for the function. (Enter your answers as a comma-separated list of equations. If an answer does not exist, enter DNE.)

$$y = \frac{9x}{x - 6}$$

horizontal asymptotes

vertical asymptotes

18. DETAILS HARMATHAP12 10.2.003.EP. MY NOTES ASK YOUR TEACHER

Consider the function.

$$g(x) = 3x^4 - 5x^3 + 13x - 4$$

Find $g'(x)$.

$g'(x) =$

Find $g''(x)$.

$g''(x) =$

Find $g''(3)$ and $g''\left(\frac{1}{3}\right)$.

$g''(3) =$ ☐

$g''\left(\frac{1}{3}\right) =$ ☐

Determine whether the function $g(x)$ is concave up or concave down at the indicated points.

(a) $x = 3$

- ○ concave up
- ○ concave down

(b) $x = \frac{1}{3}$

- ○ concave up
- ○ concave down

19. DETAILS HARMATHAP12 10.2.001. MY NOTES ASK YOUR TEACHER

Determine whether the function is concave up or concave down at the indicated points.

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

(a) $x = -3$

- ○ concave up
- ○ concave down

(b) $x = 8$

- ○ concave up
- ○ concave down

20. DETAILS HARMATHAP12 9.8.006. MY NOTES ASK YOUR TEACHER

Find the second derivative.

$$y = 5x^2 - \sqrt[5]{x^2}$$

$y'' =$

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