← MAT2601_ONL8FA_ONL8F_21 - Calculus, Fall 2021

Week 6 Homework MAT2601 (Homework)

INSTRUCTOR
Erin Cawley
SOUTH COLLEGE

Current Score

QUESTION	1	2	3	4	5	6	7	8	9	10	11	12	13
POINTS	–/5.88	–/5.88	–/5.88	–/5.88	–/5.88	–/5.88	–/5.88	–/5.88	–/5.88	–/5.88	–/5.88	–/5.88	–/5.8

TOTAL SCORE

–/100	0.0%

Due Date

TUE, NOV 9, 2021
11:59 PM EST

Request Extension

Assignment Submission & Scoring

Assignment Submission

For this assignment, you submit answers by questions. You are required to use a new randomization after every 3 question submissions.

Assignment Scoring

Your best submission for each question part is used for your score.

1. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.4.001.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

Find dy/dt using the given values.

$y = x^3 - 4x$ for $x = 3$, $dx/dt = 4$.

$\frac{dy}{dt} =$ [ ]

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2. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.4.007.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

Assume that x and y are differentiable functions of t. For the following, find dx/dt given that $x = 1$, $y = 6$, and $dy/dt = 2$.

$y^2 = 2xy + 24$

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

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3. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.4.011.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

A point is moving along the graph of the equation $y = -2x^2$. At what rate is y changing when $x = 4$ and is changing at a rate of 4 units/sec?

[ ] units/sec

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4. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.4.016.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

The lengths of the edges of a cube are increasing at a rate of 1 ft/min. At what rate is the surface area changing when the edges are 17 ft long? (Recall that for a cube, $S = 6x^2$.)

[ ] ft^2/min

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5. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.4.019.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

Suppose that the price p (in dollars) of a product is given by the demand function

$$p = \frac{18{,}000 - 60x}{400 - x}$$

where x represents the quantity demanded and $x < 300$. If the daily demand is *decreasing* at a rate of 45 units per day, at what rate (in dollars per day) is the price changing when the price per unit is \$40?

\$ [ ] per day

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6. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.4.021.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

Suppose that for a particular product, the number of units x produced per month depends on the number of thousands of dollars y invested, with $x = 50y + 20y^2$. At what rate will production increase if \$10,000 is invested and if the investment capital is increasing at a rate of \$1000 per month?

[ ] units/month^2

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7. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.4.025.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

For many species of fish, the allometric relationship between the weight W and the length L is approximately $W = kL^3$, where k is a constant. Find the rate of change of the weight as a corresponding rate of change of the length.

$\left(\frac{dL}{dt}\right)$

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8. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.4.030.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

Assume that water is being purified by causing it to flow through a conical filter that has a height of 27 in. and a radius of 9 in. If the depth of the water is decreasing at a rate of 1 in. per minute when the depth is 9 in., at what rate is the volume of water flowing out of the filter at this instant? (Round your answer to two decimal places.)

[ ] in^3/min

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9. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.4.037.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

Two cars are approaching an intersection on roads that are perpendicular to each other. Car A is north of the intersection and traveling south at 55 mph. Car B is east of the intersection and traveling west at 50 mph. How fast is the distance between the cars changing when car A is 28 miles from the intersection and car B is 21 miles from the intersection? (Round your answer to two decimal places.)

[ ] mph

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10. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.4.035.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

A plane is flying at a constant altitude of 1 mile and a speed of 250 mph toward an observer on the ground. How fast is the plane approaching the observer when it is 6 miles from the observer? (Round your answer to two decimal places.)

[ ] mph

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11. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.5.001.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

In this problem, p is in dollars and q is the number of units.

(a) Find the elasticity of the demand function $p + 8q = 480$ at $(q, p) = (30, 240)$.

(b) How will a price increase affect total revenue?

- ○ Since the demand is inelastic, an increase in price will decrease the total revenue.
- ○ Since the demand is inelastic, an increase in price will increase the total revenue.
- ○ Since the demand is elastic, an increase in price will decrease the total revenue.
- ○ Since the demand is unitary, there will be no change in the revenue with a price increase.
- ○ Since the demand is elastic, an increase in price will increase the total revenue.

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12. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.5.003.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

In this problem, p is in dollars and q is the number of units.

(a) Find the elasticity of the demand function $p^2 + 2p + q = 9$ at $p = 2$.

(b) How will a price increase affect total revenue?

- ○ Since the demand is unitary, there will be no change in the revenue with a price increase.
- ○ Since the demand is elastic, an increase in price will decrease the total revenue.
- ○ Since the demand is inelastic, an increase in price will increase the total revenue.
- ○ Since the demand is elastic, an increase in price will increase the total revenue.
- ○ Since the demand is inelastic, an increase in price will decrease the total revenue.

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13. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.5.007.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

In this problem, p is in dollars and q is the number of units.

Suppose that the demand for a product is given by $pq + p + 100q = 50{,}000$.

(a) Find the elasticity when $p = \$568$. (Round your answer to two decimal places.)

(b) Tell what type of elasticity this is.

- ○ Demand is elastic.
- ○ Demand is inelastic.
- ○ Demand is unitary elastic.

(c) How would a price increase affect revenue?

- ○ An increase in price will result in an increase in total revenue.
- ○ Revenue is unaffected by price.
- ○ An increase in price will result in a decrease in total revenue.

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14. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.5.011.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

The demand function for specialty steel products is given, where p is in dollars and q is the number of units.

$p = 120\sqrt[3]{110 - q}$

(a) Find the elasticity of demand as a function of the quantity demanded, q.

$\eta =$

(b) Find the point at which the demand is of unitary elasticity.

$q =$ [ ]

Find intervals in which the demand is inelastic and in which it is elastic. (Enter your answers using interval notation.)

inelastic

elastic

(c) Use information about elasticity in part (b) to decide where the revenue is increasing, and where it is decreasing. (Enter your answers using interval notation.)

increasing

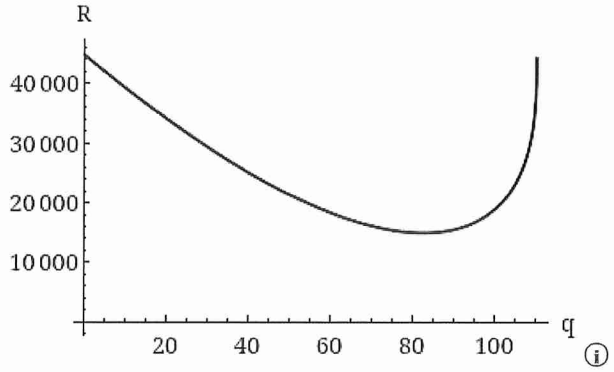
decreasing

Use information about elasticity in part (b) to decide where the revenue is maximized.

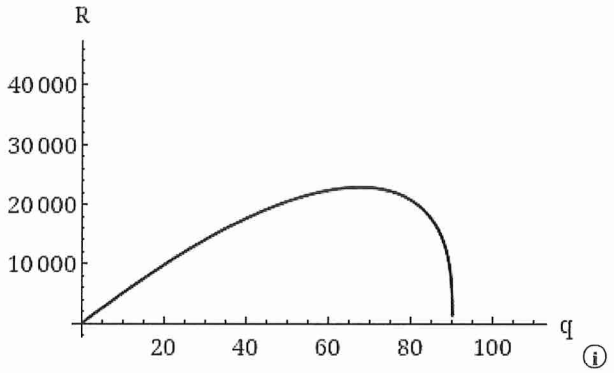
$q =$ [ ]

(d) Graph the revenue function $R = pq$, and use it to find where revenue is maximized.

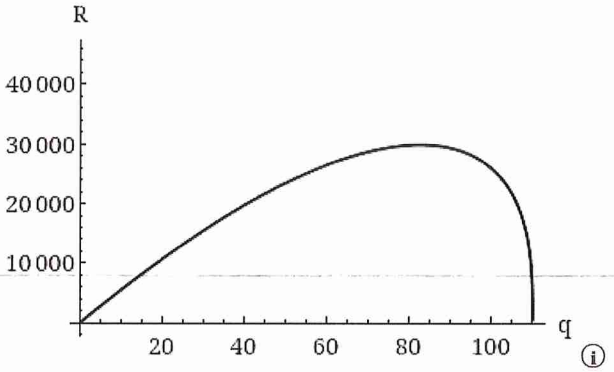
○



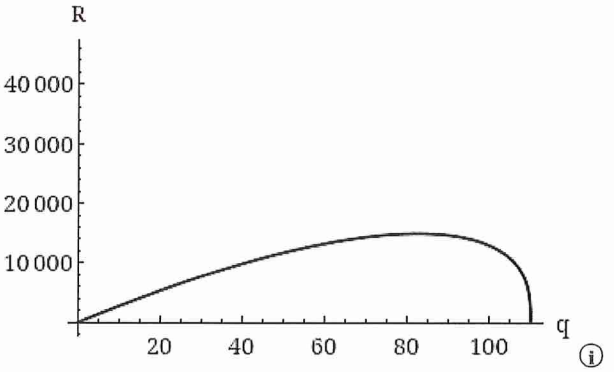
○



○



○



Is revenue maximized at the same quantity as that determined in part (c)?

○ Yes

○ No

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15. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.5.017.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

In this problem, p is the price per unit in dollars and q is the number of units.

If the demand and supply functions for a product are $p = 750 - 2q$ and $p = 100 + 0.5q$, respectively, find the tax per unit t that will maximize the tax revenue T.

$ [ ] /item

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16. **[-/5.88 Points]** DETAILS **HARMATHAP12 11.5.020.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

In this problem, p is the price per unit in dollars and q is the number of units.

If the monthly demand function is $p = 7{,}210 - 25q^2$ and the supply function before taxation is $p = 10 + 10q^2$, what tax (in dollars) per item will maximize the total revenue?

$ [ ] per item

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17. **[-/5.92 Points]** DETAILS **HARMATHAP12 11.5.024.MI.** 0/15 Submissions Used

MY NOTES ASK YOUR TEACHER

In this problem, p is the price per unit in dollars and q is the number of units.

If the demand and supply functions of a product are $p = 5000 - 20q - 0.7q^2$ and $p = 500 + 10q + 0.3q^2$, respectively, find the tax per unit t that will maximize the tax revenue T.

t = $ [ ] /item

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