Name: _____

Student ID: _____

INSTRUCTIONS:

1) There are 10 problems and 1 multiple choice problem on a total of 8 pages.
2) Write your final answers in the boxes provided.
3) You must show sufficient work to justify all answers. Correct answers with inconsistent work may not be given credit.
4) No books or notes are allowed.
5) You may use a nongraphing, nonprogrammable calculator.
6) Good luck!!

Page	Max. Possible	Points
1	6	
2	16	
3	10	
4	16	
5	10	
6	16	
7	16	
8	10	
Total	100	

(6 pts) **I. Multiple choice question.**
Note: You must show your work and circle the correct answer to receive full credit.

Let

$$f(1) = 1,\ f(2) = 2,\ f(3) = 1,$$
$$f'(1) = 0,\ f'(2) = 6,\ f'(3) = 0,$$
$$g(4) = 2,\ g(5) = 4,\ g(6) = 8,$$
$$g'(4) = 7,\ g'(5) = 2,\ g'(6) = 1$$

Then $\frac{d}{dx} f \circ g(4)$ **equals**

A) 0 **B)** 42 **C)** 12 **D)** 6 **E)** 48

Answer:

(10 pts) 3) **Find an equation of the line tangent to the graph of $x^2y^2 - xy - 2 = 0$ at the point $(1, 2)$.**

Answer:

(10 pts) 6) **A certain car depreciates according to the formula**

$$V(t) = \frac{29,000}{1 + 0.4t + 0.1t^2}$$

where V is the value of the car t years after it was purchased. How fast is the car depreciating 2 years after the purchase? Round your answer to two decimal places.

Answer:

(16 pts) 9) **The cost function and the demand equation for a certain product are: $C(x) = 15x + 550$ and $P(x) = -0.5x + 75$. Find:**

(6 pts) (a) **The revenue function and the profit function.**

Answer:

(6 pts) (b) **The marginal revenue and the marginal cost.**

Answer:

(4 pts) (c) **The number x for which marginal revenue equals marginal cost.**

Answer:

Answers.

I. 1. B

II. 1. $3x^2 + 2x + \frac{5}{2}x\sqrt{x} + \frac{3}{2}\sqrt{x}$

2. $\frac{3}{4}(1-t)^{-5/2}$

3. $y = -2x + 4$

4. $\frac{-2t^2}{(t^3-1)^2} \cdot \left(\frac{t^3+1}{t^3-1}\right)^{-2/3}$

5. $-\frac{y^3}{x^3}$

6. Depreciates at a rate $\$4793.39$ / year

7. $t = 2$

8. $6\frac{1}{120}$

9. (a) $R(x) = -0.5x^2 + 75x$
$P(x) = -0.5x^2 + 60x - 550$

(b) $R'(x) = -x + 75$
$C'(x) = 15$

(c) $x = 60$

10. Increases at a rate of 36π cm^3/sec