

Quiz 3

● Graded

Student

Ivan Wang

Total Points

20.5 / 25 pts

Question 1

Critical numbers of a function

5 / 5 pts

- ✓ - 0 pts Correct.
1. Finds $f'(x)$ correctly
 2. Sets up and solves the equation $f'(x) = 0$ correctly

Question 2

Differentiate: chain rule and log rules

4.5 / 9 pts

2.1 (a) Derivative of natural logarithmic function

4 / 4 pts

✓ - 0 pts Correct.

Correctly applies $\frac{d}{dx} [\ln u] = \frac{1}{u} \cdot u'$

2.2 (b) Mixed derivatives

0.5 / 5 pts

✓ - 5 pts No part of the derivative is correct

💬 + 0.5 pts Point adjustment

Question 3

Implicit differentiation to find dy/dx

11 / 11 pts

✓ - 0 pts Correct

Quiz 3: MTH 141- TR
Worth: 25 points

Time Limit: 25 Minutes

Name: Ivan Wang

Student ID:

5 0 4 1 4 3 2 1

Authorized item(s): None. This is a closed-note, closed-book quiz. Calculators are not allowed.

This quiz has 3 questions. Do not write on the backside of the page.

1. (5 points) Find the critical numbers of the function: $f(x) = x^3 - 3x^2 - 9x + 4$.

$$\frac{d}{dx}[x^3 - 3x^2 - 9x + 4]$$

$$f(x) \text{ domain: } (-\infty, \infty)$$

$$f'(x) \text{ domain: } (-\infty, \infty)$$

$$f'(x) = 3x^2 - 6x - 9$$

$$f'(x) = 0$$

$$3x^2 - 6x - 9 = 0$$

$$3(x^2 - 2x - 3) = 0$$

$$(x-3)(x+1)$$

(critical numbers) $x = 3, -1$

2. (9 points) Differentiate the function. There is no need to simplify your answer.

- (a) (4 points) $f(x) = \ln(3x^2 - 2x + 7)$

$$f'(x) = \frac{1}{3x^2 - 2x + 7} \cdot (3x^2 - 2x + 7)'$$

$$f'(x) = \frac{1}{3x^2 - 2x + 7} \cdot 6x - 2 = \frac{6x - 2}{3x^2 - 2x + 7}$$

$$f'(x) = \ln(3x^2 - 2x + 7) \cdot \frac{6x - 2}{3x^2 - 2x + 7}$$

- (b) (5 points) $y = e^{5x} - \cos(x^2 + 1)$

$$(e^{5x})'$$

$$e^{5x} \cdot 5$$

$$\ln y = \ln e^{5x} - \ln \cos(x^2 + 1)$$

$$\frac{1}{y} \cdot y' = \frac{1}{e^{5x}} (5e^{5x}) - \frac{1}{\cos(x^2 + 1)} (-\sin(x^2 + 1))$$

$$y' = y \left(\frac{5e^{5x}}{e^{5x}} + \frac{\sin(x^2 + 1)}{\cos(x^2 + 1)} \right) \Rightarrow y' = (e^{5x} - \cos(x^2 + 1)) \cdot \left(5 + \frac{\sin(x^2 + 1)}{\cos(x^2 + 1)} \right)$$

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5	0	4	1	4	3	2	1
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3. (11 points) Find dy/dx given that $x^3y^2 - xy^2 + 7x = e^y$. $f'g + fg'$

$$\frac{d}{dx} [x^3y^2 - xy^2 + 7x = e^y]$$

$$3x^2y^2 + 2x^3y \cdot \frac{dy}{dx} - y^2 - 2xy \cdot \frac{dy}{dx} + 7 = e^y \cdot \frac{dy}{dx}$$

$$-2x^3y \cdot \frac{dy}{dx} + 2xy \cdot \frac{dy}{dx}$$

$$3x^2y^2 - y^2 + 7 = e^y \cdot \frac{dy}{dx} + 2xy \cdot \frac{dy}{dx} - 2x^3y \cdot \frac{dy}{dx}$$

$$\frac{3x^2y^2 - y^2 + 7}{e^y + 2xy - 2x^3y} = \frac{\frac{dy}{dx} [e^y + 2xy - 2x^3y]}{e^y + 2xy - 2x^3y}$$

$$\frac{dy}{dx} = \frac{3x^2y^2 - y^2 + 7}{e^y + 2xy - 2x^3y}$$