Quiz 9

Graded

Student

Colin Cano

Total Points

5.5 / 10 pts

Question 1

1(a)   🚩 **1.5** / 3 pts

     − 0 pts Correct: Increasing interval $(e^{-\frac{1}{2}}, \infty)$; Decreasing interval $(0, e^{-\frac{1}{2}})$

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sign of $f'(x)$ and increasing/decreasing intervals

✔   **− 0.5 pts** Incorrectly identified the sign of $f'(x)$ in intervals from previous steps.

     − 0.5 pts Increasing interval is incorrect from previous steps.

     − 0.5 pts Decreasing interval is incorrect from previous steps.

✔   **− 0.5 pts** Included $(-\infty, 0)$

     ①   The function is only defined for $x > 0$

$f'(x)$ and critical numbers

     − 0.5 pts $f'(x)$ is incorrect.

✔   **− 0.5 pts** Found incorrect critical numbers of their $f'(x)$ from previous steps.

     ②   You Have to find critical numbers ifthey exist (and in this case they did exist)

     − 2 pts $f'(x)$ is correct but no further work.

     − 2.5 pts Attempted to find $f'(x)$ and no futher work.

     − 3 pts No correct work.

Question 2

1(b) 🚩 **1 / 3 pts**

    – 0 pts Correct: Concave upwards: $(e^{-\frac{3}{2}}, \infty)$; Concave downwards $(0, e^{-\frac{3}{2}})$, inflection point: $(e^{-\frac{3}{2}}; -\frac{3}{2}e^{-3})$

    – 0.5 pts Inflection point is evaluated incorrectly based on previous steps, or didn't evaluate $f(x)$ at the inflection point from previous step.

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sign of $f''(x)$ and concave upwards/downwards intervals

    – 0.5 pts Incorrectly identified the sign of $f''(x)$ in intervals from previous steps.

    ✔ **– 0.5 pts** Concave upwards interval is incorrect from previous steps.

          4

    – 0.5 pts Concave downwards interval is incorrect from previous steps.

    ✔ **– 0.5 pts** Included $(-\infty, 0)$

          6   The function is only defined for $x > 0$

$f''(x)$ and its zeros

    ✔ **– 0.5 pts** $f''(x)$ is incorrect from part (a).

          3

    ✔ **– 0.5 pts** Found incorrect zeros of $f''(x)$ from previous steps.

          5   You had to find the zeroes of f''

    – 3 pts No correct work.

Question 3

1(c) 🚩 **0 / 1 pt**

    – 0 pts Correct: local minimum value is $f(e^{-\frac{1}{2}}) = -\frac{1}{2}e^{-1}$; no local maximum. Or local max/min are concluded correctly based on part (a) and (b) answers.

    ✔ **– 0.5 pts** Local minimum is incorrect based on part (a) and (b).

    ✔ **– 0.5 pts** Local maximum is incorrect based on part (a) and (b).

    – 1 pt No correct work.

    – 0.5 pts Didn't evaluate $f(x)$ at all those local max/min points.

    💬 You had the right idea of looking for critical numbers

Question 4

2   **3** / 3 pts

✔ **– 0 pts** Correct: 0

l'Hospital's rule

    – 1 pt Didn't apply chain rule to find derivative of denominator.

    – 0.5 pts Partially incorrect derivative of denominator after applying chain rule.

    – 0.5 pts Incorrect derivative for numerator.

    – 0.5 pts Incorrect evaluation of limit from previous steps at $x = \infty$.

    – 0.5 pts Algebraic mistake.

    – 2.5 pts Took derivative directly without rewriting the function.

    – 3 pts No work.

2   **3** / 3 pts

✔ **– 0 pts** Correct: 0

Name: Colin Cano   Student ID: _____

1. (7 points) For the following given function: $f(x) = x^2 ln(x)$, $x > 0$

(a) Find the increasing and decreasing intervals of f.

$$f'(x) = \frac{2x(lnx) + x^2 \cdot \left(\frac{1}{x}\right)}{2x(lnx) + \frac{x}{x}}$$

$$f'(x) = 2x(lnx) + x \qquad = 0 \quad f' > 0$$

f is increasing on $(0, \infty)$

f is decreasing on $(-\infty, 0)$

(b) Find the intervals of concavity and inflection points of f.

$$f''(x) = \left(2(lnx) + \frac{2x}{x}\right) + x$$
$$= 2(lnx) + 2x$$

f is conc up on $(0, \infty)$

f is conc down on $(-\infty, 0)$

(c) Find local minimum and local maximum values of f.

$$f'(x) = 2x(lnx) + x = 0$$
$$\frac{2x(lnx}{2x} = \frac{-x}{2x}$$
$$lnx = \frac{-1}{2}$$

f has local min a $+x = -\frac{1}{2}$

f has local max at $x = 0$

2. (3 points) Find the following limit: $\lim\limits_{x \to \infty} 2xe^{-x^3}$

$$\lim\limits_{x \to \infty} 2xe^{-x^3} = \lim\limits_{x \to \infty} \frac{2x}{e^{x^3}} \overset{LH}{=} \frac{2}{3x^2 e^{x^3}} = 0$$

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