Quiz 2

Graded

Student

Ivan Wang

Total Points

16 / 25 pts

Question 1

Limit at infinity

3 / 8 pts

- ✔ **– 5 pts** Student does not divide numerator and denominator by the highest power of x in the denominator (It is acceptable if implied in solution)

Question 2

Differentiate the function

7 / 10 pts

Part (a): Worth 5 points

- ✔ **– 1 pt** Derivative of $1/x^2$ is incorrect
- ✔ **– 1 pt** Derivative of $2x$ is incorrect
- ✔ **– 1 pt** Derivative of 4 is incorrect

Part (b): Worth 5 points

- ✔ **– 0 pts** Derivative is correct

Question 3

Calculate derivative function using limit definition

6 / 7 pts

- ✔ **– 1 pt** Expansion of $f(x+h)$ is incorrect

Quiz 2: MTH 141- TR
Worth: 25 points

Time Limit: 20 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. (8 points) Use techniques studied in Section 2.6 (Limits at Infinity) to find the limit or show that it does not exist. Show all work.

$$\lim_{x\to\infty} \frac{5x^4 - 6x^2 + 1}{x^3 + x - 2x^4}$$

$\frac{5}{-2}$

$\lim_{x\to\infty} \frac{5x^4-6x^2+1}{x^3+x-2x^4} = -\frac{5}{2}$

2. (10 points) Differentiate the function. You may use any applicable derivative rule from Section 3.1.

(a) (5 points) $f(x) = \left(\frac{1}{x^2} - 2x + 4\right)x^2 \Rightarrow 1 - 3x^3 + 4x^2$

$f'(x) = \frac{d}{dx}[1] - \frac{d}{dx}[3x^3] + \frac{d}{dx}[4x^2]$

$\frac{d}{dx}[1x^0]$ $\quad -3\frac{d}{dx}3x^2 + 4\frac{d}{dx}2x^1$

$1\frac{d}{dx}0x^{-1} = 0$ $\quad -9x^2 + 8x$ $\quad f'(x) = \frac{d}{dx} = -9x^2 + 8x$

(b) (5 points) $y = 2e^x - \sqrt{x} + 6x^2 = 2e^x - x^{\frac{1}{2}} + 6x^2$

$y' = \frac{d}{dx}[2e^x] - \frac{d}{dx}[x^{\frac{1}{2}}] + \frac{d}{dx}[6x^2]$

$2\frac{d}{dx}e^x - \frac{1}{x}x^{-\frac{1}{2}} + 6\frac{d}{dx}2x^1$

$y' = 2e^x - \frac{1}{2}x^{-\frac{1}{2}}\ 12x$

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3. (7 points) Find the derivative of $f(x) = x^2 - 3x$ using the limit definition of the derivative (provided to the right). Any solution that does not use this limit will receive NO CREDIT.

Limit Definition:

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} \rightarrow \frac{(x+h)^2 - 3(x+h) - (x^2 - 3x)}{h}$

$\rightarrow \frac{x^2 + xh + h^2 - 3x - 3h + x^2 + 3x}{h}$

$\rightarrow \lim_{h \to 0} \frac{xh + h^2 - 3h}{h}$

$\lim_{h \to 0} \frac{h(x+h-3)}{h}$

$\lim_{h \to 0} x+h-3$

$\lim_{h \to 0} x+0-3$

$\lim_{h \to 0} x-3$

$f'(x) = \lim_{h \to 0} x-3$