

Quiz 1

● Graded

Student

Ivan Wang

Total Points

25 / 25 pts

Question 1

Calculate limits using the limit laws

10 / 10 pts

Part (a): Worth 2 points

- ✓ - 0 pts Part (a) is entirely correct. The student correctly multiplies the two limits. No need to simplify

Correct: $\lim_{x \rightarrow 1} f(x)g(x) = (2)(6)$

Part (b): Worth 3 points

- ✓ - 0 pts Part (b) is entirely correct. The student correctly applies sum and constant multiple limit laws. No need to simplify

Correct: $\lim_{x \rightarrow 1} [5f(x) + g(x)] = 5(2) + 6$

Part (c): Worth 5 points

- ✓ - 0 pts Part (b) is entirely correct. The student correctly applies quotient, different, and constant multiple limit laws. No need to simplify

Correct: $\lim_{x \rightarrow 1} \left[\frac{f(x) - 2g(x)}{h(x)} \right] = \frac{2 - 2(6)}{-3}$

Question 2

Calculate limit at a number of a rational function

5 / 5 pts

- ✓ - 0 pts Correct. All parts of the solution are correct. The student uses correct limit notation.

Question 3

Determine if continuous at a number

10 / 10 pts

- ✓ - 0 pts Correct. All parts of the solution are correct.
1. Uses limit notation and correctly calculates left-hand and right-hand limits at $a = -1$
 2. Makes conclusion that follows from work shown
 3. Justifies why (definition of continuous at a number a) the function is continuous or discontinuous at the designated number

Quiz 1: 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. (10 points) Suppose:

$$\lim_{x \rightarrow 1} f(x) = 2, \quad \lim_{x \rightarrow 1} g(x) = 6, \quad \text{and} \quad \lim_{x \rightarrow 1} h(x) = -3.$$

Use the limit laws to find the following limits. There is no need to simplify your final answer.

(a) (2 points) $\lim_{x \rightarrow 1} [f(x)g(x)]$

$$\downarrow \quad \downarrow$$

$$2 \cdot 6 = 12 \quad \lim_{x \rightarrow 1} [f(x)g(x)] = 12$$

(b) (3 points) $\lim_{x \rightarrow 1} [5f(x) + g(x)]$

$$\downarrow \quad \downarrow$$

$$2 \quad 6$$

$$\lim_{x \rightarrow 1} 5f(x) + \lim_{x \rightarrow 1} g(x)$$

$$5(2) + 6 = 16$$

$$\lim_{x \rightarrow 1} [5f(x) + g(x)] = 16$$

(c) (5 points) $\lim_{x \rightarrow 1} \left[\frac{f(x) - 2g(x)}{h(x)} \right] = \frac{10}{3}$

$$\frac{\lim_{x \rightarrow 1} f(x) - 2 \lim_{x \rightarrow 1} g(x)}{\lim_{x \rightarrow 1} h(x)} \Rightarrow \frac{2 - 2(6)}{-3} \Rightarrow \frac{2 - 12}{-3} = \frac{-10}{-3} = \frac{10}{3}$$

10

Name: Ivan Wang

Student ID:

5	0	4	1	4	3	2	1
---	---	---	---	---	---	---	---

2. (5 points) Find the limit or show that it does not exist. The score 0/5 will be recorded for the use of L'Hospital's rule.

$$\frac{2^2 - 2 - 2}{2^2 + 2 - 6} = \frac{4 - 2 - 2}{4 + 2 - 6} = \frac{0}{0}$$

$$\lim_{x \rightarrow 2} \frac{x^2 - x - 2}{x^2 + x - 6} = \frac{3}{5}$$

$$\lim_{x \rightarrow 2} \frac{x^2 - x - 2}{x^2 + x - 6} \Rightarrow \lim_{x \rightarrow 2} \frac{\cancel{(x-2)}(x+1)}{(x+3)\cancel{(x-2)}} \Rightarrow \lim_{x \rightarrow 2} \frac{(x+1)}{(x+3)}$$

$$\frac{2+1}{2+3} = \frac{3}{5}$$

3. (10 points) Determine if the function is continuous at the specified number. Justify your answer using the definition of continuous at a number. Your solution should include one-sided limits.

$$f(x) = \begin{cases} x^2 + 4x, & \text{if } x < -1 \\ -2x + 2, & \text{if } x \geq -1 \end{cases} \quad \text{at } a = -1$$

$$\lim_{x \rightarrow -1^-} x^2 + 4x \Rightarrow 1 - 4 = -3$$

$$\lim_{x \rightarrow -1} f(x) = \text{DNE}$$

$$\lim_{x \rightarrow -1^+} -2x + 2 \Rightarrow 2 + 2 = 4$$

Discontinuous, $f(x)$ is defined but the $\lim_{x \rightarrow -1} f(x)$ is undefined.