

Math 131 - Quiz 2

September 2, 2020

Name Key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (4 points) Consider the following limit: $\lim_{x \rightarrow 0} \frac{(3x^2 + 7)|x|}{x}$

(a) Explain why the limit laws cannot be used to determine the limit.

THE LIMIT OF THE DENOMINATOR IS ZERO.

WE CANNOT USE THE LIMIT LAWS IN THIS CASE.

$$f(x) = \frac{(3x^2 + 7)|x|}{x}$$

- (b) The actual limit fails to exist. In which of the four common ways does it fail to exist? Justify your reasoning.

X	0.1	0.01	0.001	-0.1	-0.01	-0.001
f(x)	7.03	7.0003	7.000003	-7.03	-7.0003	-7.000003

THE LIMIT FROM THE LEFT IS NOT EQUAL TO THE LIMIT FROM THE RIGHT.

2. (6 points) Evaluate each limit analytically. DO NOT USE A CALCULATOR.

(a) $\lim_{x \rightarrow 1} \frac{x(x+2) + 2(x+1) - 7}{2x-2}$ 0% more work!

$$= \lim_{x \rightarrow 1} \frac{x^2 + 4x - 5}{2x - 2} = \lim_{x \rightarrow 1} \frac{(x-1)(x+5)}{2(x-1)} = \frac{6}{2} = \boxed{3}$$

(b) $\lim_{x \rightarrow \pi/6} \frac{3 \sin x}{2x}$

$$= \frac{3 \sin \frac{\pi}{6}}{2(\frac{\pi}{6})} = \frac{3(\frac{1}{2})}{\frac{\pi}{3}} = \boxed{\frac{9}{2\pi}}$$

(c) $\lim_{x \rightarrow 4} \frac{x-4}{\sqrt{x}-2}$ 0% more work!

$$\lim_{x \rightarrow 4} \frac{x-4}{\sqrt{x}-2} \cdot \frac{\sqrt{x}+2}{\sqrt{x}+2} = \lim_{x \rightarrow 4} \frac{(x-4)(\sqrt{x}+2)}{x-4}$$

$$= \sqrt{4} + 2 = \boxed{4}$$