

Math 131 - Quiz 2

August 27, 2025

Name key

Score _____

Show all work to receive credit. Supply explanations where necessary. Partial credit may be awarded on multiple choice problems for correct work or explanations.

1. (3 points) Find the exact value (not a decimal approximation) of each limit.

(a) $\lim_{x \rightarrow -2} (4x^2 - 5x + 7) = 4(-2)^2 - 5(-2) + 7 = 16 + 10 + 7 = \boxed{33}$

(b) $\lim_{x \rightarrow \pi/3} (\sqrt{3x} \sin x) = \sqrt{3(\pi/3)} \sin \frac{\pi}{3} = \sqrt{\pi} \left(\frac{\sqrt{3}}{2} \right) = \boxed{\frac{\sqrt{3\pi}}{2}}$

2. (4 points) Suppose that you are given the following information:

$$f(3) = 8, \quad \lim_{x \rightarrow 3} f(x) = -5, \quad g(3) = 0, \quad \lim_{x \rightarrow 3} g(x) = 4.$$

Find each limit. Carefully show how you are using the limit laws.

(a) $\lim_{x \rightarrow 3} [6f(x) - 2g(x)] = 6 \lim_{x \rightarrow 3} f(x) - 2 \lim_{x \rightarrow 3} g(x) = 6(-5) - 2(4) = \boxed{-38}$
Use #'s 3 & 5

(b) $\lim_{x \rightarrow 3} \left(\frac{x^2 f(x)}{g(x)} \right) = \frac{\left(\lim_{x \rightarrow 3} x \right)^2 \lim_{x \rightarrow 3} f(x)}{\lim_{x \rightarrow 3} g(x)} = \frac{(3)^2 (-5)}{(4)} = \boxed{-\frac{45}{4}}$
Use #'s 6, 4, 8

3. (3 points) Explain why neither the limit laws nor direct substitution can be used to evaluate each limit.

(a) $\lim_{x \rightarrow \pi/2} \left(\frac{\tan x}{\sin x} \right)$ TAN X IS NOT DEFINED AT $X = \frac{\pi}{2}$

(b) $\lim_{x \rightarrow 1} \sqrt{1-x^2}$ $\sqrt{1-x^2}$ IS NOT DEFINED FOR $X > 1$.

(c) $\lim_{x \rightarrow 0} \left(\frac{\sqrt[3]{x}}{\sin x} \right)$ SIN 0 = 0. LIMIT OF DENOM IS ZERO.