

Math 131 - Quiz 2

January 28, 2026

Name key

Score _____

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

1. (4 points) Use the limit laws to determine each limit analytically. Show, in detail, how you used the limit laws.

$$(a) \lim_{x \rightarrow 3} (5x + 7) = 5 \lim_{x \rightarrow 3} x + \lim_{x \rightarrow 3} 7 = 5(3) + 7 = \boxed{22}$$

$$(b) \lim_{x \rightarrow -2} \frac{\sqrt{7-x}}{x} = \frac{\sqrt{\lim_{x \rightarrow -2} 7 - \lim_{x \rightarrow -2} x}}{\lim_{x \rightarrow -2} x} = \frac{\sqrt{7 - (-2)}}{-2} = \frac{\sqrt{9}}{-2} = \boxed{-\frac{3}{2}}$$

2. (4 points) Use any technique to find or estimate the limit.

$$(a) \lim_{x \rightarrow 5} x^2 \sin(\pi x) \quad \text{Direct subs gives} \quad (5)^2 \sin(5\pi) = (25)(0) = \boxed{0}$$

$$(b) \lim_{x \rightarrow 1} (4x^5 - 9x^2 - 8x + 12) = 4(1)^5 - 9(1)^2 - 8(1) + 12$$

Direct subs

$$= 4 - 9 - 8 + 12 = \boxed{-1}$$

$$(c) \lim_{x \rightarrow 3} \frac{x^2 - x - 6}{x - 3} \quad \% \text{ More work.} = \lim_{x \rightarrow 3} \frac{(x-3)(x+2)}{x-3} = \lim_{x \rightarrow 3} (x+2) = 3+2 = \boxed{5}$$

3. (2 points) Explain why direct substitution CANNOT be used to evaluate each limit.

$$(a) \lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1} \quad \text{Direct subs gives a zero denom. Cannot use because the function is not defined at } x=1.$$

$$(b) \lim_{x \rightarrow 8} \sqrt{8-x} \quad \sqrt{8-x} \text{ is not defined on an interval around } x=8. \text{ In fact, } \sqrt{8-x} \text{ is not defined when } x > 8.$$