

# Math 131 - Quiz 3

September 7, 2023

Name key

Score \_\_\_\_\_

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

1. (9 points) Evaluate each limit analytically. Show all work.

(a)  $\lim_{x \rightarrow 9} \frac{x-9}{3-\sqrt{x}}$  % More work

$$\lim_{x \rightarrow 9} \frac{x-9}{3-\sqrt{x}} \cdot \frac{3+\sqrt{x}}{3+\sqrt{x}} = \lim_{x \rightarrow 9} \frac{(x-9)(3+\sqrt{x})}{(9-x)}$$

$$\lim_{x \rightarrow 9} \frac{(x-9)(3+\sqrt{x})}{(-1)(x-9)} = \frac{6}{-1} = \boxed{-6}$$

(b)  $\lim_{w \rightarrow -2} \frac{(w+3)^2 - w^2 + 3}{w+2}$  % More work

$$\lim_{w \rightarrow -2} \frac{w^2 + 6w + 9 - w^2 + 3}{w+2} = \lim_{w \rightarrow -2} \frac{6w + 12}{w+2} = \lim_{w \rightarrow -2} \frac{6(w+2)}{w+2} = \boxed{6}$$

(c)  $\lim_{x \rightarrow 0} \frac{\sin 6x}{7x}$  % More work

$$= \frac{1}{7} \lim_{x \rightarrow 0} \frac{6}{6} \cdot \frac{\sin 6x}{x} = \frac{6}{7} \lim_{x \rightarrow 0} \frac{\sin 6x}{6x} = \frac{6}{7} (1) = \boxed{\frac{6}{7}}$$

2. (1 point) Suppose  $\lim_{x \rightarrow 5} f(x) = 13$ . What can you say about  $\lim_{x \rightarrow 5^-} f(x)$ ?

IF THE TWO-SIDED LIMIT EXISTS,  
THE ONE-SIDED LIMITS EXIST  
AND ALL ARE EQUAL.

$$\lim_{x \rightarrow 5^-} f(x) = 13$$