

Math 131 - Quiz 3

September 2, 2026

Name key

Score _____

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

1. Choose any three of the following four problems. Find each limit analytically. Show all work. Each problem is worth $3\frac{1}{3}$ points.

(a) $\lim_{\theta \rightarrow 0} \frac{\tan 6\theta}{4\theta}$ % More work.

$$\lim_{\theta \rightarrow 0} \frac{\sin 6\theta}{4\theta \cos 6\theta} = \lim_{\theta \rightarrow 0} \frac{6}{4} \frac{\sin 6\theta}{6\theta} \frac{1}{\cos 6\theta} = \frac{6}{4} \cdot 1 \cdot 1 = \boxed{\frac{3}{2}}$$

(b) $\lim_{x \rightarrow -1^-} \frac{|x+1|(x+3)}{x+1}$ % More work.

$$\begin{aligned} |x+1| &= -(x+1) \text{ when } x < -1 \\ &= \lim_{x \rightarrow -1^-} \frac{-(x+1)(x+3)}{x+1} = -(-1+3) = \boxed{-2} \end{aligned}$$

(c) $\lim_{t \rightarrow 16} \frac{4-\sqrt{t}}{32-2t} \cdot \frac{4+\sqrt{t}}{4+\sqrt{t}}$ % More work

$$\begin{aligned} &= \lim_{t \rightarrow 16} \frac{16-t}{2(16-t)(4+\sqrt{t})} = \lim_{t \rightarrow 16} \frac{1}{2(4+\sqrt{t})} \\ &= \boxed{\frac{1}{16}} \end{aligned}$$

(d) $\lim_{x \rightarrow 4} f(x)$ where $f(x) = \begin{cases} x + \cos \pi x, & x < 4 \\ (x-2)^2 + 1, & x > 4 \end{cases}$

$$\lim_{x \rightarrow 4^-} f(x) = \lim_{x \rightarrow 4} (x + \cos \pi x) = 4 + \cos 4\pi = 5$$

$$\lim_{x \rightarrow 4^+} f(x) = \lim_{x \rightarrow 4} [(x-2)^2 + 1] = 4 + 1 = 5$$

$$\boxed{\lim_{x \rightarrow 4} f(x) = 5}$$