

Name: Key Date _____**Instructions:** For each question, neatly write a solution and circle your answer.1. Evaluate $\lim_{x \rightarrow 3} \frac{\sqrt{x+1} - 2}{x-3}$.

$$\lim_{x \rightarrow 3} \frac{\sqrt{x+1} - 2}{x-3} \left(\frac{\sqrt{x+1} + 2}{\sqrt{x+1} + 2} \right) = \lim_{x \rightarrow 3} \frac{x+1-4}{(x-3)(\sqrt{x+1}+2)}$$

$$= \lim_{x \rightarrow 3} \frac{\cancel{(x-3)}}{\cancel{(x-3)}(\sqrt{x+1}+2)} = \lim_{x \rightarrow 3} \frac{1}{\sqrt{x+1}+2} = \frac{1}{\sqrt{3+1}+2}$$

$$= \frac{1}{\sqrt{4}+2} = \frac{1}{2+2} = \boxed{\frac{1}{4}}$$

2. Evaluate $\lim_{x \rightarrow 0} x^3 \sin\left(\frac{1}{x^2}\right)$.

Squeeze Theorem

$$-1 \leq \sin\left(\frac{1}{x^2}\right) \leq 1$$

$$-|x^3| \leq x^3 \sin\left(\frac{1}{x^2}\right) \leq |x^3|$$

$$\lim_{x \rightarrow 0} -|x^3| = 0$$

$$\lim_{x \rightarrow 0} |x^3| = 0$$

$$\therefore \lim_{x \rightarrow 0} x^3 \sin\left(\frac{1}{x^2}\right) = \boxed{0}$$