

No Calculator: Show all work on separate paper.

$$1. \lim_{x \rightarrow -4} \frac{x^2 + 5x + 4}{x^2 + 3x - 4} = \frac{3}{5}$$

$$5. \lim_{r \rightarrow 9} \frac{9-r}{3-\sqrt{r}} = 6$$

$$9. \lim_{h \rightarrow 0} \frac{(3+h)^{-1} - 3^{-1}}{h} = -\frac{1}{9}$$

$$2. \lim_{x \rightarrow 2} \frac{x^2 - x + 6}{x - 2} = \emptyset$$

$$6. \lim_{x \rightarrow 7} \frac{\sqrt{x+2} - 3}{x - 7} = \frac{1}{6}$$

$$10. \lim_{x \rightarrow 0} \frac{\sin 7x}{x} = 7$$

$$3. \lim_{t \rightarrow 1} \frac{t^3 - 1}{t^2 - 1} = \frac{3}{2}$$

$$7. \lim_{x \rightarrow 2} \frac{x^4 - 16}{x - 2} = 32$$

$$11. \lim_{\alpha \rightarrow 0} \frac{\cos \alpha \tan \alpha}{\alpha} = 1$$

$$4. \lim_{h \rightarrow 0} \frac{(1+h)^4 - 1}{h} = 4$$

$$8. \lim_{x \rightarrow -4} \frac{\frac{1}{4} + \frac{1}{x}}{4+x} = -\frac{1}{16}$$

$$12. \lim_{\theta \rightarrow \frac{\pi}{2}} \frac{\cos \theta}{\cot \theta} = 1$$

$$13. \lim_{t \rightarrow 0} g(t) \text{ if } g(t) = \begin{cases} 2t + 1 & \text{for } t < 0 \\ 6 & \text{for } t = 0 \\ \ln(t + 1) & \text{for } t > 0 \end{cases} \quad \emptyset$$

$$14. \lim_{w \rightarrow -\frac{3}{2}} g(w) \text{ if } g(w) = \begin{cases} (2w)^2 + \frac{17}{3}w & \text{for } w < -\frac{3}{2} \\ \cos\left(\frac{-2\pi w}{9}\right) & \text{for } w \geq -\frac{3}{2} \end{cases} \quad 0.5$$

15. Is there a number  $k$  such that  $\lim_{x \rightarrow -2} \frac{3x^2 + kx + k + 3}{x^2 + x - 2}$  exists? If so, find the value of  $k$  and the value of the limit.

$k = 15$  and the limit is 3