

AP Calculus AB
Unit 1 – Day 2 Assignment

Name: _____

Analytical Approach to Finding Limits

Find the value of each limit. For a limit that does not exist, state why.

1. $\lim_{x \rightarrow -\frac{1}{2}} 3x^2(2x-1)$	2. $\lim_{x \rightarrow -1} x^3 + 2x^2 - 3x + 3$
3. $\lim_{x \rightarrow -2} (x-6)^{\frac{2}{3}}$	4. $\lim_{x \rightarrow 2} \frac{x^2+5x+6}{x+2}$
5. $\lim_{\theta \rightarrow \frac{\pi}{6}} \theta^2 \tan \theta$	6. $\lim_{x \rightarrow 0} \frac{(x+4)^2-16}{x}$
7. $\lim_{x \rightarrow 1} \frac{x-1}{x^2-1}$	8. $\lim_{x \rightarrow 2} \frac{x^2-3x+2}{x^2-4}$

9. $\lim_{x \rightarrow 0} \frac{5x^3 + 8x^2}{3x^4 - 16x^2}$

10. $\lim_{x \rightarrow 0} \frac{\frac{1}{x+2} - \frac{1}{2}}{x}$

11. $\lim_{x \rightarrow 0} \frac{(2+x)^3 - 8}{x}$

12. $\lim_{h \rightarrow 0} \frac{(x+h)^2 + 2(x+h) - 3 - (x^2 + 2x - 3)}{h}$

13. $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ if $f(x) = 3x^2 - 2x$

14. $\lim_{x \rightarrow 2} f(x)$ if $f(x) = \begin{cases} 2x^2 - 4x, & x < 2 \\ 4 \sin\left(\frac{\pi x}{4}\right), & x > 2 \end{cases}$

$$15. \lim_{x \rightarrow 3} e^x \cos\left(\frac{\pi x}{3}\right)$$

$$16. \lim_{x \rightarrow 1} \frac{\sqrt{x+3}-2}{x-1}$$

$$17. \lim_{x \rightarrow 3^+} \frac{x+3}{x-3}$$

$$18. \lim_{x \rightarrow -3^+} \frac{2x^2-9x+9}{x^2-9}$$

$$19. \lim_{x \rightarrow 0} \frac{\frac{1}{x-2} + \frac{1}{2}}{x}$$

$$20. \lim_{x \rightarrow -2} \begin{cases} 2-x, & x < -2 \\ x^2-2x, & x > -2 \end{cases}$$

21. If $\lim_{x \rightarrow 3} f(x) = 2$ and $\lim_{x \rightarrow 3} g(x) = -4$, find each of the following limits. Show your analysis applying the properties of limits.

a. $\lim_{x \rightarrow 3} \left[\frac{5f(x)}{g(x)} \right]$	b. $\lim_{x \rightarrow 3} [f(x) + 2g(x)]$	c. $\lim_{x \rightarrow 3} \sqrt{4f(x)}$
d. $\lim_{x \rightarrow 3} \frac{g(x)}{8}$	e. $\lim_{x \rightarrow 3} [3f(x) - g(x)]$	f. $\lim_{x \rightarrow 3} \left[\frac{f(x)g(x)}{12} \right]$

22. If $\lim_{x \rightarrow 4} f(x) = 0$ and $\lim_{x \rightarrow 4} g(x) = 3$, find each of the following limits. Show your analysis applying the properties of limits.

a. $\lim_{x \rightarrow 4} \left[\frac{g(x)}{f(x)-1} \right]$	b. $\lim_{x \rightarrow 4} xf(x)$
c. $\lim_{x \rightarrow 4} [g(x) + 3]$	d. $\lim_{x \rightarrow 4} g^2(x)$