

Name _____ Date _____ Period _____

Worksheet 1.4—Algebraic Limits

Show all work. No Calculator

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

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

3. $\lim_{t \rightarrow 2} \frac{t^3 + 2t^2 - 13t + 10}{t^3 + 4t^2 - 4t - 16} =$

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

5. $\lim_{h \rightarrow 0} \frac{4(x+h)^2 - 3(x+h) + 5 - (4x^2 - 3x + 5)}{h} =$

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

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

8. $\lim_{x \rightarrow 0} \frac{\cot 4x}{\cot 3x} =$

9.
$$\lim_{x \rightarrow 0} \frac{\sin x}{5x^2 - x} =$$

10.
$$\lim_{x \rightarrow 0} \frac{4x + \sin 2x}{x} =$$

11.
$$\lim_{x \rightarrow 4^+} \frac{3x - 12}{|8 - 2x|} =$$

12.
$$\lim_{\Theta \rightarrow 0} \frac{\sin^3 \Theta}{\Theta^2 (1 + \cos \Theta)} =$$

13.
$$\lim_{x \rightarrow \pi/3} \frac{2\cos^2 x + 3\cos x - 2}{2\cos x - 1} =$$

14.
$$\lim_{u \rightarrow \infty} \frac{4u^4 + 4}{(u^2 - 2)(2u^2 - 1)} =$$

15.
$$\lim_{x \rightarrow -4} \frac{(x+4)\ln(x+6)}{x^2 - 16} =$$

16.
$$\lim_{x \rightarrow -2} \frac{\sin(x+2)}{x+2} =$$

17.
$$\lim_{r \rightarrow 9} \frac{\sqrt{r}}{(r-9)^4} =$$

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

$$19. \lim_{x \rightarrow \infty} \tan^{-1} x =$$

$$20. \lim_{x \rightarrow \frac{f}{2}^+} \tan x =$$

$$21. \lim_{x \rightarrow 3^+} \left(x - 3 - \frac{1}{x-3} \right) =$$

$$22. \lim_{m \rightarrow 0} \frac{\cos(x+m) - \cos x}{m} = \text{Use: } \cos(x+m) = \cos x \cos m - \sin x \sin m$$

$$23. \text{ If } g(x) = \begin{cases} 5-2x, & x > 1 \\ 4, & x = 1 \\ 4-x, & x < 1 \end{cases} \text{ find:}$$

$$(a) \lim_{x \rightarrow 5} g(x)$$

$$(b) \lim_{x \rightarrow 1^-} g(x)$$

$$(c) \lim_{x \rightarrow 1^+} g(x)$$

$$(d) \lim_{x \rightarrow 1} g(x)$$

$$24. \text{ If } 1 \leq f(x) \leq x^2 + 2x + 2, \text{ find } \lim_{x \rightarrow -1} f(x)$$

Justify.

$$25. \text{ If } 3x \leq f(x) \leq x^3 + 2, \text{ evaluate } \lim_{x \rightarrow 1} f(x)$$

No need to justify.

26. If $\lim_{x \rightarrow a} f(x) = -3$, $\lim_{x \rightarrow a} h(x) = 8$, find $\lim_{x \rightarrow a} \frac{2f(x)}{h(x) - f(x)}$

Multiple Choice

_____ 27. If $f(x) = \sqrt{x+2}$, then $\lim_{h \rightarrow 0} \frac{f(2+h) - f(2)}{h} =$
 (A) 4 (B) 0 (C) $\frac{1}{2}$ (D) $\frac{1}{4}$ (E) 1

_____ 28. $\lim_{x \rightarrow \infty} \frac{(1-2x^2)^3}{(x^2+1)^3} =$
 (A) 8 (B) $-\infty$ (C) 0 (D) ∞ (E) -8

_____ 29. If $\lim_{n \rightarrow \infty} \frac{6n^2}{200 - 4n + kn^2} = \frac{1}{2}$, then $k =$
 (A) 3 (B) 6 (C) 12 (D) 8 (E) 2

_____ 30. $\lim_{x \rightarrow 0^+} \left(\frac{15 \log x}{\sqrt[15]{x}} \right) =$
 (A) 15 (B) 0 (C) ∞ (D) $-\infty$ (E) -15

_____ 31. $\lim_{x \rightarrow \infty} \left(\frac{15 \log x}{\sqrt[15]{x}} \right) =$
 (A) 15 (B) 0 (C) ∞ (D) $-\infty$ (E) -15