Name_____ Date_____ Period_____

Worksheet 1.4—Algebraic Limits

Show all work. No Calculator

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

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

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

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

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

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

7. $\displaystyle\lim_{x \to 1} \frac{(2x-3)\left(\sqrt{x} - 1\right)}{2x^2 + x - 3} =$

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

9. $\lim\limits_{x \to 0} \dfrac{\sin x}{5x^2 - x} =$

10. $\lim\limits_{x \to 0} \dfrac{4x + \sin 2x}{x} =$

11. $\lim\limits_{x \to 4^+} \dfrac{3x - 12}{|8 - 2x|} =$

12. $\lim\limits_{\Theta \to 0} \dfrac{\sin^3 \Theta}{\Theta^2 (1 + \cos \Theta)} =$

13. $\lim\limits_{x \to \pi/3} \dfrac{2\cos^2 x + 3\cos x - 2}{2\cos x - 1} =$

14. $\lim\limits_{u \to \infty} \dfrac{4u^4 + 4}{(u^2 - 2)(2u^2 - 1)} =$

15. $\lim\limits_{x \to -4} \dfrac{(x + 4)\ln(x + 6)}{x^2 - 16} =$

16. $\lim\limits_{x \to -2} \dfrac{\sin(x + 2)}{x + 2} =$

17. $\lim\limits_{r \to 9} \dfrac{\sqrt{r}}{(r - 9)^4} =$

18. $\lim\limits_{x \to 2^+} \dfrac{x^3 |x-2|}{x-2} =$

19. $\lim\limits_{x \to \infty} \tan^{-1} x =$

20. $\lim\limits_{x \to \frac{\pi}{2}^+} \tan x =$

21. $\lim\limits_{x \to 3^+} \left(x - 3 - \dfrac{1}{x-3} \right) =$

22. $\lim\limits_{m \to 0} \dfrac{\cos(x+m) - \cos x}{m} =$ Use: $\cos(x+m) = \cos x \cos m - \sin x \sin m$

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

(a) $\lim\limits_{x \to 5} g(x)$

(b) $\lim\limits_{x \to 1^-} g(x)$

(c) $\lim\limits_{x \to 1^+} g(x)$

(d) $\lim\limits_{x \to 1} g(x)$

24. If $1 \le f(x) \le x^2 + 2x + 2$, find $\lim\limits_{x \to -1} f(x)$

    Justify.

25. If $3x \le f(x) \le x^3 + 2$, evaluate $\lim\limits_{x \to 1} f(x)$

    No need to justify.

26. If $\lim\limits_{x \to a} f(x) = -3$, $\lim\limits_{x \to a} h(x) = 8$, find $\lim\limits_{x \to a} \dfrac{2f(x)}{h(x) - f(x)}$

Multiple Choice

_____ 27. If $f(x) = \sqrt{x+2}$, then $\lim\limits_{h \to 0} \dfrac{f(2+h) - f(2)}{h} =$

           (A) 4   (B) 0   (C) $\dfrac{1}{2}$ (D) $\dfrac{1}{4}$ (E) 1

_____ 28. $\lim\limits_{x \to \infty} \dfrac{\left(1 - 2x^2\right)^3}{\left(x^2 + 1\right)^3} =$

           (A) 8   (B) $-\infty$ (C) 0   (D) ∞ (E) -8

_____ 29. If $\lim\limits_{n \to \infty} \dfrac{6n^2}{200 - 4n + kn^2} = \dfrac{1}{2}$, then $k =$

           (A) 3   (B) 6   (C) 12   (D) 8   (E) 2

_____ 30. $\lim\limits_{x \to 0^+} \left(\dfrac{15 \log x}{\sqrt[15]{x}} \right) =$

           (A) 15   (B) 0   (C) ∞ (D) $-\infty$ (E) -15

_____ 31. $\lim\limits_{x \to \infty} \left(\dfrac{15 \log x}{\sqrt[15]{x}} \right) =$

           (A) 15   (B) 0   (C) ∞ (D) $-\infty$ (E) -15