

1.4

Limits of Transcendental Functions
HW Day 1

Name _____

Date _____ Period _____

Problems 1 - 6, find the limits of each exponential function. If necessary, sketch a graph of the function to help you determine the behavior and limit.

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

2. $\lim_{x \rightarrow \infty} 2^{x-3} + 4$

3. $\lim_{x \rightarrow -\infty} -(0.25)^{-x+1} + 5$

4. $\lim_{x \rightarrow 3} \left(\frac{1}{2}\right)^{3-x} - 1$

5. $\lim_{x \rightarrow -1} -4^{-x-1} + 5$

6. $\lim_{x \rightarrow \infty} -\left(\frac{1}{3}\right)^{2-x} - 3$

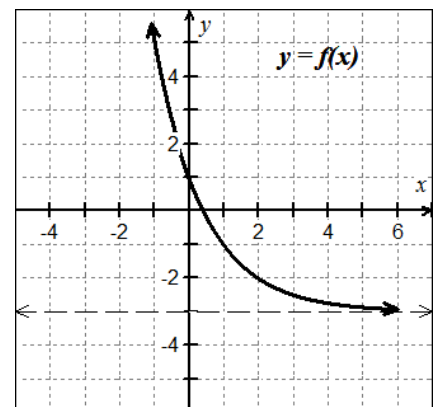
Problems 7 - 10, use the graph of $y = f(x)$ at right, to find each of the following limits.

7. $\lim_{x \rightarrow \infty} f(x) = \underline{\hspace{2cm}}$

8. $\lim_{x \rightarrow -\infty} f(x) = \underline{\hspace{2cm}}$

9. $\lim_{x \rightarrow 0} f(x) = \underline{\hspace{2cm}}$

10. $\lim_{x \rightarrow 2} f(x) = \underline{\hspace{2cm}}$



Problems 11 - 28, evaluate the limits, if they exist.

11. $\lim_{x \rightarrow 0} \frac{\sin 3x}{x}$

12. $\lim_{x \rightarrow 0} \frac{\sin x \sec x}{x}$

13. $\lim_{x \rightarrow 0} \frac{e^x \cos x}{2}$

14. $\lim_{x \rightarrow \frac{\pi}{2}} \frac{1 - \cos x}{3x}$

15. $\lim_{x \rightarrow 0} \frac{x + \sin x}{x}$

16. $\lim_{x \rightarrow 4} e^{3-x} + 4$

$$17. \lim_{x \rightarrow 2} \begin{cases} 3x^2 - 2x, & x < 2 \\ 7 - \cos\left(\frac{\pi x}{3}\right), & x \geq 2 \end{cases}$$

$$18. \lim_{\theta \rightarrow \frac{\pi}{3}} \frac{\cos^2 \theta}{1 - \sin \theta}$$

$$19. \lim_{x \rightarrow 3} \begin{cases} \ln x, & 0 < x < 2 \\ x^2 \ln x, & 2 \leq x \leq 4 \end{cases}$$

$$20. \lim_{x \rightarrow 0} \frac{\sin x}{3x^2 - x}$$

$$21. \lim_{x \rightarrow \frac{\pi}{3}} \frac{2\sin^2 x + 3\sin x - 2}{2\sin x - 1}$$

$$22. \lim_{x \rightarrow 0} \frac{5x + \sin 2x}{x}$$

$$23. \lim_{x \rightarrow 0} \frac{3^x \cos x}{4}$$

$$24. \lim_{x \rightarrow -3} \left(\frac{1}{4}\right)^{-x-4} + 5$$

25. $\lim_{\theta \rightarrow 0} \frac{5 \cos \theta - 5}{\theta}$

26. $\lim_{x \rightarrow -3} \frac{(x + 3) \ln(x + 5)}{x^2 - 9}$

27. $\lim_{\theta \rightarrow 0} \frac{\sin 3\theta + 1 - \cos \theta}{\theta}$

28. $\lim_{\theta \rightarrow 0} \frac{\cos \theta \sin \theta - \sin \theta}{\theta^2}$

Problems 29 - 30, Use the Squeeze Theorem to evaluate the following limits.

29. $\lim_{x \rightarrow 0} x^2 \cos\left(\frac{1}{x}\right)$

30. If $0 \leq f(x) \leq c$ for some real number c ,
prove that $\lim_{x \rightarrow 0} x^2 f(x) = 0$