

1.15 Limits at Infinity and Horizontal Asymptotes

Calculus

Name: _____

Identify the horizontal asymptotes of each function.

1. $f(x) = \frac{\sqrt{9x^6+2x^2+x}}{x^3+9x^2}$	2. $f(x) = \frac{(3x+1)(x-4)}{(5x+1)^2}$
3. $f(x) = \frac{(4x+3)(6-3x)}{(3x-4)^2}$	4. $f(x) = \frac{5x^2}{\sqrt{5x^4-2x}}$

Evaluate each limit.

5. $\lim_{x \rightarrow \infty} \frac{2x^4+3x^3+4}{5x^7+2x^4+2x^3}$	6. $\lim_{x \rightarrow \infty} 4^{-x} + 1$	7. $\lim_{x \rightarrow \infty} \frac{6x^6-3x^3+5}{2x^3+x^8+2x^4}$	8. $\lim_{x \rightarrow \infty} -x \cos x$
9. $\lim_{x \rightarrow \infty} \sin\left(\frac{4x+\pi x^2}{x^3}\right)$	10. $\lim_{x \rightarrow \infty} \sin(6x)$	11. $\lim_{x \rightarrow \infty} \frac{-5x^4-3x^2-6}{10x^4+6x+11}$	12. $\lim_{x \rightarrow \infty} \cos\left(\frac{x+4\pi x^2}{10-2x^2}\right)$
13. $\lim_{x \rightarrow \infty} \frac{2x^2+3x^4+1}{6x^2+5x-10}$	14. $\lim_{x \rightarrow \infty} \left(3 \sin \frac{1}{x}\right)$	15. $\lim_{x \rightarrow \infty} \frac{e^3}{3^x}$	16. $\lim_{x \rightarrow \infty} \left(\frac{\sin x}{x}\right)$

9. 0	10. DNE, Oscillating.	11. $-\frac{1}{2}$	12. 1	13. ∞	14. 0	15. 0	16. 0
1. $\gamma = 3$ and $\gamma = -3$	2. $\gamma = \frac{25}{3}$	3. $\gamma = -\frac{3}{4}$	4. $\gamma = \sqrt{5}$	5. 0	6. 1	7. 0	8. DNE, Oscillating.