

Important theorem: $\lim_{x \rightarrow \infty} \frac{1}{x} = 0$

Limits Involving Infinity
(Principle of Dominance)

1. $\lim_{x \rightarrow \infty} \frac{x^a}{x^b}$, if $a < b$. Then, limit = 0. (Look for the highest degrees/powers of x)

2. $\lim_{x \rightarrow \infty} \frac{Cx^a}{Dx^b}$, if $a = b$. Then, limit = $\frac{C}{D}$. (Look for the highest degrees/powers of x)

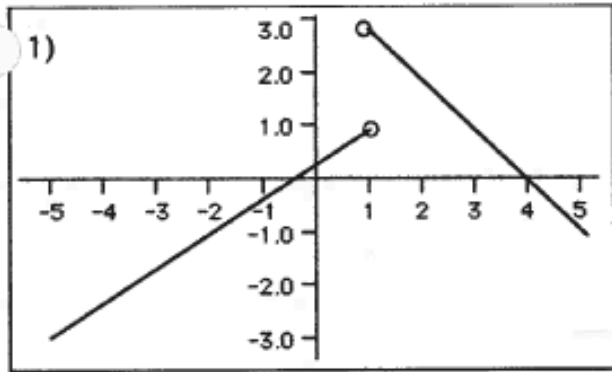
3. $\lim_{x \rightarrow \infty} \frac{x^a}{x^b}$, if $a > b$. Then, limit = ∞ or $-\infty$.

(Look for the highest degrees/powers of x and check the sign of ∞ by substituting with a large x-value.)

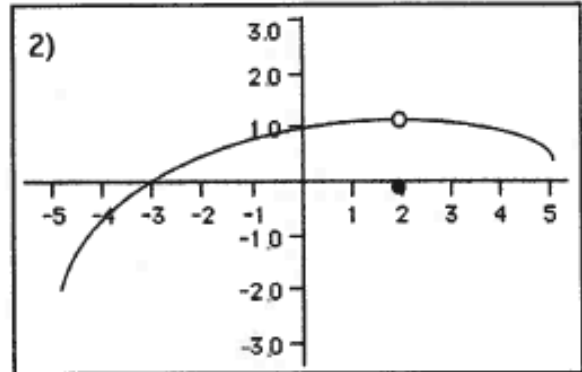
Part 1: Use the properties below as well as algebra and or graphing to find the following limits.

1. $\lim_{x \rightarrow \infty} \left(7 + \frac{1}{3x} - \frac{2}{x^2} \right)$	2. $\lim_{x \rightarrow \infty} \frac{4x+8}{5x}$	3. $\lim_{x \rightarrow \infty} \frac{3x-1000}{x+100}$	4. $\lim_{x \rightarrow \infty} \frac{5x+5}{7x^2+1}$
5. $\lim_{x \rightarrow \infty} \frac{5x^2+2}{4x^2+7}$	6. $\lim_{x \rightarrow \infty} \frac{3x^3+5}{5x^2+1}$	7. $\lim_{x \rightarrow \infty} \frac{2x^2-4x}{x+1}$	8. $\lim_{x \rightarrow \infty} \frac{2x^2-4x}{x+1}$
9. $\lim_{x \rightarrow \infty} \frac{3x^3+2}{5x^2-1}$	10. $\lim_{x \rightarrow \infty} \frac{3x^2+2}{4x^2-1}$	11. $\lim_{x \rightarrow \infty} \frac{x^2+2}{x-555}$	12. $\lim_{x \rightarrow \infty} \frac{3-2x}{3x^3-1}$
13. $\lim_{x \rightarrow \infty} \frac{3-5x}{3x-1}$	14. $\lim_{x \rightarrow \infty} \frac{3-2x^2}{3x-1}$	15. $\lim_{x \rightarrow \infty} \frac{6x^2-2x-1}{2x^2+3x+2}$	16. $\lim_{x \rightarrow \infty} \frac{3x^3+2}{2x^2-9x^3+7}$
17. $\lim_{x \rightarrow \infty} \frac{x}{x^2-1}$	18. $\lim_{x \rightarrow \infty} \frac{8x^2+3x}{2x^2-1}$	19. $\lim_{x \rightarrow \infty} \left(10 - \frac{2}{x^2} \right)$	20. $\lim_{x \rightarrow \infty} \left(4 + \frac{3}{x} \right)$

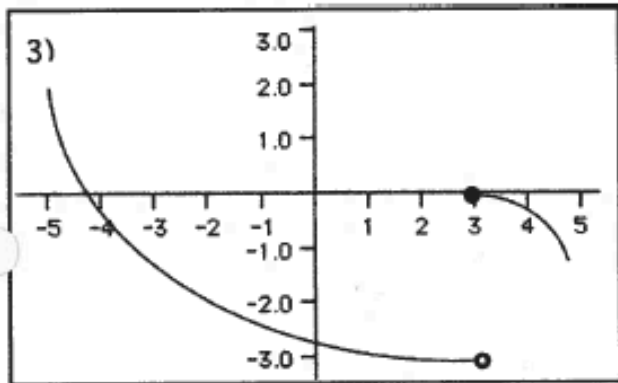
Part 2: Answer the following using the graphs provided.



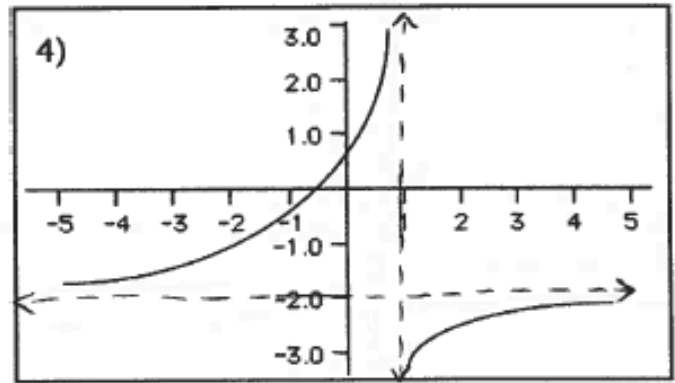
$\lim_{x \rightarrow 1} f(x)$ $f(1)$ $\lim_{x \rightarrow -\infty} f(x)$ $\lim_{x \rightarrow \infty} f(x)$



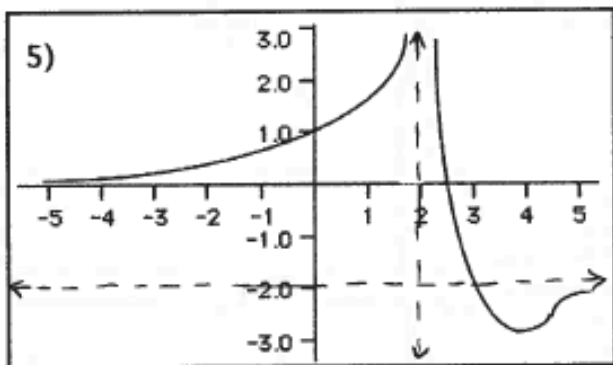
$\lim_{x \rightarrow 2} f(x)$ $f(2)$



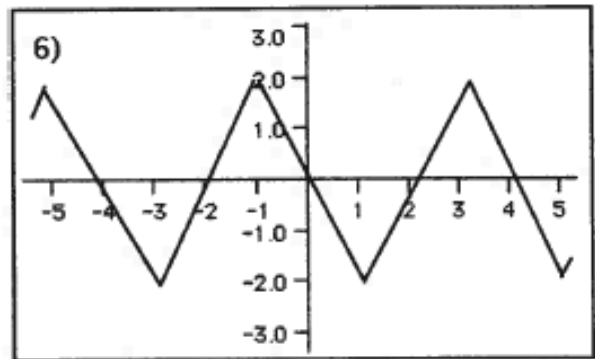
$\lim_{x \rightarrow 3^-} f(x)$ $\lim_{x \rightarrow 3^+} f(x)$ $\lim_{x \rightarrow 3} f(x)$ $f(3)$



$\lim_{x \rightarrow 1} f(x)$ $\lim_{x \rightarrow -\infty} f(x)$ $\lim_{x \rightarrow \infty} f(x)$



$\lim_{x \rightarrow 2} f(x)$ $f(2)$ $\lim_{x \rightarrow -\infty} f(x)$ $\lim_{x \rightarrow \infty} f(x)$



$\lim_{x \rightarrow 0} f(x)$ $f(0)$ $\lim_{x \rightarrow \infty} f(x)$