For each of the following functions, describe the asymptotic behavior by filling in the blanks with either 0^+, 0^-, $-\infty$, or ∞.

1. $y = x^{-2}$

   (a) As $x \to 0^-$, $y \to$ _____

   (b) As $x \to 0^+$, $y \to$ _____

   (c) As $x \to -\infty$, $y \to$ _____

   (d) As $x \to \infty$, $y \to$ _____

2. $y = x^{-3}$

   (a) As $x \to 0^-$, $y \to$ _____

   (b) As $x \to 0^+$, $y \to$ _____

   (c) As $x \to -\infty$, $y \to$ _____

   (d) As $x \to \infty$, $y \to$ _____

3. $y = -\dfrac{5}{x}$

   (a) As $x \to 0^-$, $y \to$ _____

   (b) As $x \to 0^+$, $y \to$ _____

   (c) As $x \to -\infty$, $y \to$ _____

   (d) As $x \to \infty$, $y \to$ _____

4. $y = -\dfrac{2}{x^4}$

   (a) As $x \to 0^-$, $y \to$ _____

   (b) As $x \to 0^+$, $y \to$ _____

   (c) As $x \to -\infty$, $y \to$ _____

   (d) As $x \to \infty$, $y \to$ _____

For the given function, use a graphing calculator to complete the table, describe the asymptotic behavior by filling in the blanks with an appropriate symbol, and then identify the asymptote (its equation and type)

5. $f(x) = \dfrac{2x+1}{x-3}$

x	*f*(x)
2.5	
2.9	
2.99	
2.999	
3.5	
3.1	
3.01	
3.001	

As $x \to 3^-$, $y \to$ _____

As $x \to 3^+$, $y \to$ _____

x	*f*(x)
–10	
–100	
–1,000	
–10,000	
10	
100	
1,000	
10,000	

As $x \to -\infty$, $y \to$ _____

As $x \to \infty$, $y \to$ _____

Asymptotes:

For each of the following functions, describe the asymptotic behavior by filling in the blanks with an appropriate symbol or indicate that no answer is possible.

6. $y = \dfrac{1}{x-2} - 3$

   (a) As $x \to -\infty$, $y \to$ _____

   (b) As $x \to \infty$, $y \to$ _____

   (c) As $x \to$ _____, $y \to -\infty$

   (d) As $x \to$ _____, $y \to \infty$

7. $y = 4 - \dfrac{1}{(x+1)^2}$

   (a) As $x \to -\infty$, $y \to$ _____

   (b) As $x \to \infty$, $y \to$ _____

   (c) As $x \to$ _____, $y \to -\infty$

   (d) As $x \to$ _____, $y \to \infty$