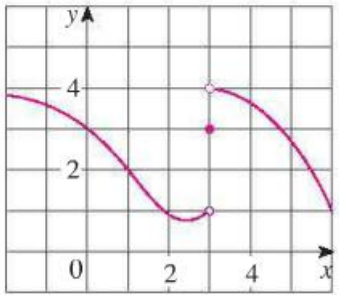
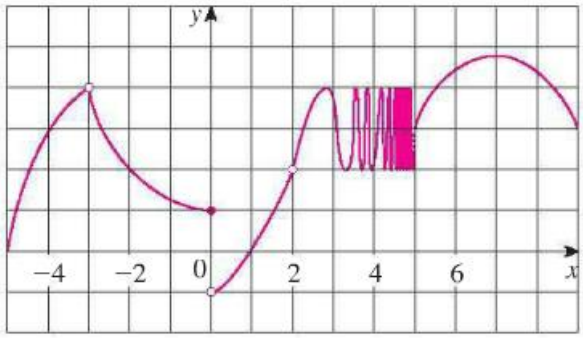
1. Explain what is meant by $\lim_{x\to 2} f(x)=5$. Is it possible for this statement to be true and $f(2)=3$?
2. Explain the meaning of
   a. $\lim_{x\to 1^-} f(x)=3$
   b. $\lim_{x\to 1^+} f(x)=7$

   In this situation, is it possible that $\lim_{x\to 1} f(x)$ exists?
3. For the function, f, whose graph is given on the right, state the value of each quantity, if it exists. If it doesn't exist, state why.



   (a) $\lim_{x\to 1} f(x)$ (b) $\lim_{x\to 3^-} f(x)$ (c) $\lim_{x\to 3^+} f(x)$

   (d) $\lim_{x\to 3} f(x)$ (e) $f(3)$
4. For the function, h, whose graph is given on the right, state the value of each quantity, if it exists. If it doesn't exist, state why.

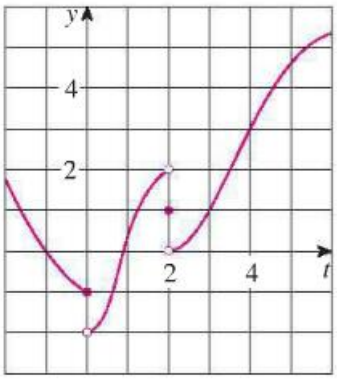


   (a) $\lim_{x\to -3^-} h(x)$ (b) $\lim_{x\to -3^+} h(x)$ (c) $\lim_{x\to -3} h(x)$

   (d) $h(-3)$ (e) $\lim_{x\to 0^-} h(x)$ (f) $\lim_{x\to 0^+} h(x)$

   (g) $\lim_{x\to 0} h(x)$ (h) $h(0)$ (i) $\lim_{x\to 2} h(x)$

   (j) $h(2)$ (k) $\lim_{x\to 5^+} h(x)$ (l) $\lim_{x\to 5^-} h(x)$
5. For the function, g, whose graph is given on the right, state the value of each quantity, if it exists. If it doesn't exist, state why.



   (a) $\lim_{t\to 0^-} g(t)$ (b) $\lim_{t\to 0^+} g(t)$ (c) $\lim_{t\to 0} g(t)$

   (d) $\lim_{t\to 2^-} g(t)$ (e) $\lim_{t\to 2^+} g(t)$ (f) $\lim_{t\to 2} g(t)$

   (g) $g(2)$ (h) $\lim_{t\to 4} g(t)$
6. Sketch the graph of the piecewise-defined function

$$f(x)=\begin{cases} x+1 & \text{if } x<-1 \\ x^2 & \text{if } -1\le x<1 \\ -x+2 & \text{if } x\ge 1 \end{cases}$$

   and use it to determine all real numbers, a, such that $\lim_{x\to a} f(x)$ exist.
7. Sketch the graph of a function that satisfies the given properties: $\lim_{x\to 0^-} f(x)=-1$, $\lim_{x\to 0^+} f(x)=2$, $f(0)=1$

#s 8 – 10 Guess the following limits by numerical methods. (Grapher can check.)

8. $\lim\limits_{x\to 2}\dfrac{x^2-2x}{x^2-x-2}$
9. $\lim\limits_{x\to 0}\dfrac{\sqrt{x+4}-2}{x}$
10. $\lim\limits_{x\to 1}\dfrac{x^6-1}{x^{10}-1}$

11. Graph and zoom, to determine the limit (if it exists). (Numerical methods can check.)
$\lim\limits_{x\to 0}\dfrac{\cos(2x)-\cos(x)}{x^2}$

#s Determine the infinite limits

12. $\lim\limits_{x\to -3^+}\dfrac{x+2}{x+3}$
13. $\lim\limits_{x\to 2\pi^-} x\csc(x)$
14. a. Find the vertical asymptotes of $f(x)=\dfrac{x^2+1}{3x-2x^2}$.
    b. Confirm by graphing.