

## Graphical limit problems

Instructions: For each problem,

- (1) Make your best guess as to what you think the limit should be, and write this number in the first space at the right. Answers might be  $\pm\infty$  or that the limit does not exist. On the ones with no hints, write “?” if you truly have no idea.
- (2) Use a graphing calculator or computer to try to graphically determine the limit as accurately as you can. Draw the graph in the space below the problem, being sure to give scales on the axes.
- (3) Write the numerical answer from Part (2) in the second space at the right.

*However*, if you give a reason why your guess must be correct, and you get it right, you need not do Parts (2) and (3).

1.  $\lim_{x \rightarrow 2} (x + 7)$ . (For your guess, think about what  $x + 7$  will be when  $x$  is close to 2.)

Your guess: \_\_\_\_\_

Limit: \_\_\_\_\_

2.  $\lim_{x \rightarrow 2} \frac{x^2 + 5x - 14}{x - 2}$ . (For your guess, simplify the fraction and compare with  $\lim_{x \rightarrow 2} (x + 7)$ .)

Your guess: \_\_\_\_\_

Limit: \_\_\_\_\_

3.  $\lim_{x \rightarrow -2} \frac{1}{x - 2}$  (For your guess, think about what  $\frac{1}{x - 2}$  will be when  $x$  is close to  $-2$ .)

Your guess: \_\_\_\_\_

Limit: \_\_\_\_\_

2  
4.  $\lim_{x \rightarrow -2} \frac{x+2}{x^2-4}$  (For your guess, simplify the fraction and compare with  $\lim_{x \rightarrow -2} \frac{1}{x-2}$ .)

Your guess: \_\_\_\_\_

Limit: \_\_\_\_\_

5.  $\lim_{x \rightarrow 2} \frac{\sqrt{x} - \sqrt{2}}{x - 2}$

Your guess: \_\_\_\_\_

Limit: \_\_\_\_\_

6.  $\lim_{x \rightarrow 2} \frac{x-2}{\sqrt{x} - \sqrt{2}}$ . (For your guess, compare with  $\lim_{x \rightarrow 2} \frac{\sqrt{x} - \sqrt{2}}{x-2}$ .)

Your guess: \_\_\_\_\_

Limit: \_\_\_\_\_

7.  $\lim_{x \rightarrow 2} \frac{\sqrt[3]{x} - \sqrt[3]{2}}{x - 2}$ .

Your guess: \_\_\_\_\_

Limit: \_\_\_\_\_

8.  $\lim_{x \rightarrow 0} \frac{\sin(x)}{x}$

Your guess: \_\_\_\_\_

Limit: \_\_\_\_\_

9.  $\lim_{x \rightarrow 2} \frac{\sin(x-2)}{x-2}$ . (For your guess, compare with  $\lim_{x \rightarrow 0} \frac{\sin(x)}{x}$ .)

Your guess: \_\_\_\_\_

Limit: \_\_\_\_\_

10.  $\lim_{x \rightarrow 2} \left( \frac{x^2 + 5x - 14}{x - 2} + \frac{\sin(x-2)}{x-2} \right)$ . (For your guess, compare with  $\lim_{x \rightarrow 2} \frac{x^2 + 5x - 14}{x - 2}$   
and  $\lim_{x \rightarrow 2} \frac{\sin(x-2)}{x-2}$ .)

Your guess: \_\_\_\_\_

Limit: \_\_\_\_\_

11.  $\lim_{x \rightarrow 0} \frac{\sin(3x)}{3x}$ . (For your guess, compare with  $\lim_{x \rightarrow 0} \frac{\sin(x)}{x}$ .)

Your guess: \_\_\_\_\_

Limit: \_\_\_\_\_

12.  $\lim_{x \rightarrow 0} \frac{\sin(3x)}{x}$ . (For your guess, compare with  $\lim_{x \rightarrow 0} \frac{\sin(3x)}{3x}$ .)

Your guess: \_\_\_\_\_

Limit: \_\_\_\_\_

13.  $\lim_{x \rightarrow 0} \frac{S(x)}{x}$ , where  $S(x)$  is the sine of the angle  $x$  degrees. (Set your calculator in degree mode, but be sure to set it back to radians after doing this problem!)

Your guess: \_\_\_\_\_

Limit: \_\_\_\_\_