Suggested practice questions (the answers are in the back of the textbook):

- §2.3; 21, 27, 33, 37, 43, 55, 61.
- §2.5; 21, 35, 41, 45.

1. Calculate the following limits, if they exist:
   
   (i) \( \lim_{x \to 9} \frac{x^2 - 81}{\sqrt{x} - 3} \),
   
   (ii) \( \lim_{x \to -1} \frac{|x| - 1}{x + 1} \).

2. Let \( f(x) \) be the function given by:

   \[
   f(x) = \begin{cases} 
   x^2 - c^2, & \text{when } x < 4; \\
   x(5 + c), & \text{when } x \geq 4. 
   \end{cases}
   \]

   For what values of the constant \( c \) is the function continuous?

3. Does the limit \( \lim_{x \to \infty} \cos x \) exist? If not, why not?

4. Let \( f(x) = (2 + x)^3(1 - x)(3 - x) \). Calculate:

   \[
   \lim_{x \to -\infty} f(x) \quad \text{and} \quad \lim_{x \to \infty} f(x).
   \]

   Sketch a graph of \( y = f(x) \), making sure that you label the points of intersection with the axes.

5. By using the Squeeze Theorem, show that:

   \[
   \lim_{x \to 0} \left( \sqrt{x^5 + 3x} \cos \frac{\pi}{x} \right) = 0.
   \]

6. Is there a constant \( a \) such that

   \[
   \lim_{x \to -3} \frac{x^2 + ax + a + 3}{x^2 + 2x - 3}
   \]

   exists? If so, find the value of \( a \) and the corresponding value of the limit.

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