

# Self-Assessment Quiz: Limits and Behavior at Infinity

*Ungraded Quiz – For Practice and Understanding*

**Q1.** The limit of a function describes:

- (a) The exact value of  $f(x)$  at a point
- (b) The behavior of  $f(x)$  as  $x$  approaches a certain value
- (c) The slope of the tangent
- (d) The area under the curve

**Q2.**  $\lim_{x \rightarrow 3} (2x + 5)$  equals:

- (a) 6
- (b) 8
- (c) 11
- (d) 10

**Q3.** The limit of a constant function  $f(x) = c$  as  $x \rightarrow a$  is:

- (a)  $a$
- (b) 0
- (c)  $c$
- (d) Undefined

**Q4.** If  $\lim_{x \rightarrow 2^-} f(x) = 5$  and  $\lim_{x \rightarrow 2^+} f(x) = 7$ , then:

- (a)  $\lim_{x \rightarrow 2} f(x) = 6$
- (b)  $\lim_{x \rightarrow 2} f(x) = 7$
- (c)  $\lim_{x \rightarrow 2} f(x)$  does not exist
- (d)  $\lim_{x \rightarrow 2} f(x) = 5$

**Q5.** The **limit laws** allow us to:

- (a) Differentiate sums and products
- (b) Evaluate limits of sums, products, and quotients using known limits
- (c) Approximate limits graphically
- (d) Simplify trigonometric expressions

**Q6.** Which of the following functions has a **removable discontinuity**?

- (a)  $f(x) = \frac{x^2-1}{x-1}$
- (b)  $f(x) = \frac{1}{x-2}$
- (c)  $f(x) = \tan(x)$

(d)  $f(x) = |x|$

**Q7.** The function  $f(x)$  approaches a horizontal line  $y = L$  as  $x \rightarrow \infty$ . Then:

- (a)  $\lim_{x \rightarrow \infty} f(x) = 0$
- (b)  $\lim_{x \rightarrow \infty} f(x) = L$
- (c)  $f(x)$  diverges
- (d)  $f(x)$  is unbounded

**Q8.** The expression  $\lim_{x \rightarrow \infty} \frac{1}{x}$  is equal to:

- (a) 0
- (b) 1
- (c)  $\infty$
- (d) Does not exist

**Q9.** For rational functions  $f(x) = \frac{P(x)}{Q(x)}$ , where  $\deg P < \deg Q$ ,  $\lim_{x \rightarrow \infty} f(x)$  equals:

- (a) 0
- (b)  $\infty$
- (c)  $-\infty$
- (d) 1

**Q10.** For rational functions where  $\deg P = \deg Q$ ,  $\lim_{x \rightarrow \infty} f(x)$  is:

- (a) Ratio of leading coefficients
- (b) 0
- (c)  $\infty$
- (d) Undefined

**Q11.** The function  $f(x) = \frac{3x^2+2}{x^2+5}$  approaches which horizontal asymptote as  $x \rightarrow \infty$ ?

- (a)  $y = 3$
- (b)  $y = 1$
- (c)  $y = 0$
- (d)  $y = 5$

**Q12.** If  $\lim_{x \rightarrow a} f(x) = L$ , and  $f$  is continuous at  $a$ , then:

- (a)  $f(a) = L$
- (b)  $f(a)$  does not exist
- (c)  $L = 0$
- (d)  $f(a)$  may differ from  $L$

**Answers (for self-check):**

1(b), 2(c), 3(c), 4(c), 5(b), 6(a), 7(b), 8(a), 9(a), 10(a), 11(a), 12(a)