

Evaluate each of the following limits.

1. 
$$\lim_{x \rightarrow 3^-} \frac{x+2}{x^2-25}$$

2. 
$$\lim_{x \rightarrow 5^-} \frac{-4x}{x+5}$$

3. 
$$\lim_{x \rightarrow 0} \frac{x - \frac{1}{x}}{x + \frac{1}{x}}$$

4. 
$$\lim_{x \rightarrow -1} \frac{2x^2 + x - 1}{x + 1}$$

5. 
$$\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$$

6. 
$$\lim_{x \rightarrow 2^+} \frac{x^2 - 4}{x + 1}$$

7. 
$$\lim_{x \rightarrow 4} \frac{x^3 - 64}{x - 4}$$

8. 
$$\lim_{x \rightarrow 2} \frac{x + 2}{x^2 - 4}$$

9. 
$$\lim_{x \rightarrow 1} \frac{x^2 - x - 2}{x^2 - 1}$$

10. 
$$\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1}$$

11. 
$$\lim_{x \rightarrow 0^+} \frac{x-3}{x}$$

12. 
$$\lim_{x \rightarrow 0^-} \frac{x-3}{x}$$

## 5.1-5.4 Quiz Practice

Date \_\_\_\_\_ Period \_\_\_\_\_

**Simplify each expression and state the excluded values.**

1)  $\frac{x-5}{8x+8} + \frac{6}{3}$

2)  $\frac{5k}{2} + \frac{2k}{9k^2 - 24k}$

3)  $\frac{3x}{2x-4} - \frac{8x}{3}$

4)  $\frac{7}{3n-4} - \frac{5}{n-6}$

5)  $\frac{\frac{3}{u^2}}{\frac{2}{u^2} - \frac{1}{9}}$

6)  $\frac{\frac{2}{4}}{\frac{1}{x^2} - \frac{1}{4}}$

7)  $\frac{\frac{x}{6} + \frac{36}{x}}{4}$

8)  $\frac{\frac{u-3}{u-3}}{\frac{2}{u-3} + \frac{u-3}{9}}$

9)  $\frac{5}{m-1} \div \frac{7m^2 + 56m}{1-m}$

10)  $\frac{p-6}{5p+15} \cdot \frac{5p+15}{7p^2}$

11)  $\frac{18}{n+7} \div \frac{n+5}{n+7}$

12)  $\frac{2x+6}{5x} \div \frac{x^2+9x+18}{5x}$

$$13) \frac{7x^2 - 80x + 100}{2x - 20}$$

$$14) \frac{10r^2 + 50r}{3r^3 + 15r^2}$$

$$15) \frac{3m - 27}{3m^2 - 22m - 45}$$

$$16) \frac{3n^2 + 2n - 40}{6n + 24}$$

**Identify all points of discontinuity for each graph, then label as infinite, jump, or removable. Use limits to describe the behavior near each vertical asymptote.**

$$17) f(x) = \frac{x^3 - 2x^2 - 8x}{-4x^2 - 4x + 8}$$

$$18) f(x) = \frac{x^3 - 5x^2 + 4x}{4x^2 - 12x}$$

$$19) f(x) = \frac{x^3 + x^2 - 6x}{3x^2 - 6x - 9}$$

$$20) f(x) = \frac{x^3 - x}{-3x^2 + 27}$$

$$21) f(x) = \frac{-x - 3}{x^2 - 2x - 3}$$

$$22) f(x) = \frac{1}{2x^2 + 2x - 4}$$

$$23) f(x) = \frac{x - 2}{x - 4}$$

$$24) f(x) = \frac{x^2 + 2x}{-4x - 16}$$

## Answers to 5.1-5.4 Quiz Practice

- |                                                                              |                                                                              |                                                                              |                                                        |
|------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------------|
| 1) $\frac{17x + 11}{8(x + 1)}$                                               | 2) $\frac{45k^2 - 120k + 4}{6(3k - 8)}$                                      | 3) $\frac{41x - 16x^2}{6(x - 2)}$                                            | 4) $\frac{-8n - 22}{(3n - 4)(n - 6)}$                  |
| 5) $\frac{54}{7u^2}$                                                         | 6) $\frac{8x^2}{16 - x^2}$                                                   | 7) $\frac{x^2 + 216}{24x}$                                                   | 8) $\frac{18}{11}$                                     |
| 9) $-\frac{5}{7m(m + 8)}; \{1, 0, -8\}$                                      | 10) $\frac{p - 6}{7p^2}; \{-3, 0\}$                                          | 11) $\frac{18}{n + 5}; \{-7, -5\}$                                           |                                                        |
| 12) $\frac{2}{x + 6}; \{0, -3, -6\}$                                         | 13) $\frac{7x - 10}{2}; \{10\}$                                              | 14) $\frac{10}{3r}; \{0, -5\}$                                               | 15) $\frac{3}{3m + 5}; \left\{-\frac{5}{3}, 9\right\}$ |
| 16) $\frac{3n - 10}{6}; \{-4\}$                                              | 17) Discontinuities: 1, -2<br>Vertical Asym.: $x = 1$<br>Holes: $x = -2$     | 18) Discontinuities: 3, 0<br>Vertical Asym.: $x = 3$<br>Holes: $x = 0$       |                                                        |
| 19) Discontinuities: -1, 3<br>Vertical Asym.: $x = -1, x = 3$<br>Holes: None | 20) Discontinuities: 3, -3<br>Vertical Asym.: $x = 3, x = -3$<br>Holes: None | 21) Discontinuities: -1, 3<br>Vertical Asym.: $x = -1, x = 3$<br>Holes: None |                                                        |
| 22) Discontinuities: -2, 1<br>Vertical Asym.: $x = -2, x = 1$<br>Holes: None | 23) Discontinuities: 4<br>Vertical Asym.: $x = 4$<br>Holes: None             | 24) Discontinuities: -4<br>Vertical Asym.: $x = -4$<br>Holes: None           |                                                        |