# Unit 3: Rational Functions and Equations

**ADVANCED**

Name: _____ Date: _____

*Solve each problem and give the exact answer. Use plain-text notation (e.g., 3/4, x+5, y=1/2); write "no solution" where appropriate.*

**1.** Find the vertical asymptote of f(x) = (x^2 - 9)/(x^2 - 2x - 15). (Note: one factor cancels, so give only the x-value of the true vertical asymptote.)

**Answer:** _____

**2.** Find the horizontal asymptote of f(x) = (3x^2 - 5x + 2)/(6x^2 + x - 1). Give the answer in the form y = a number.

**Answer:** _____

**3.** Solve for x: 2/(x - 3) + 5/(x + 2) = 3/(x^2 - x - 6).

**Answer:** _____

**4.** Find the x-intercept of f(x) = (2x^2 - 8)/(x^2 + x - 2). Give only the x-value (exclude any value that is a hole or asymptote).

**Answer:** _____

**5.** Find the slant (oblique) asymptote of f(x) = (x^2 + 3x - 4)/(x - 2). Give the answer in the form y = an expression.

**Answer:** _____

**6.** Solve for x: x/(x - 4) = 3 + 4/(x - 4). If the only candidate is excluded from the domain, answer 'no solution'.

**Answer:** _____

**7.** The function f(x) = (x^2 - x - 6)/(x - 3) has a removable discontinuity (hole). Find the y-coordinate of that hole.

**Answer:** _____

**8.** Solve for x: 1/(x - 1) - 2/(x + 1) = 4/(x^2 - 1). If the only candidate is excluded from the domain, answer 'no solution'.

**Answer:** _____

**9.** Find the sum of all solutions of the equation 1 + 6/x = 7/x^2.

**Answer:** _____

**10.** Find the horizontal asymptote of f(x) = (4x^3 - 2x + 1)/(2x^3 + x^2 - 7). Give the answer in the form y = a number.

**Answer:** _____

**11.** The function f(x) = (x + 1)/(x^2 - x - 12) has two vertical asymptotes. Find the sum of the two x-values where they occur.

**Answer:** _____