

Unit 4 Part 2 Rational Expressions Exam Review

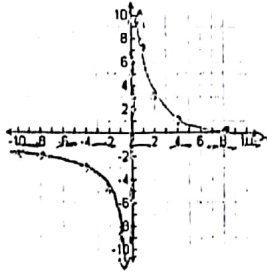
Unit 4 Part 2 Review

Directions: Sketch the asymptotes and the graph of each function. Identify the domain and the range.

1.  $y = \frac{8}{x} - 1$

D:  $\{x | x \neq 0\}$

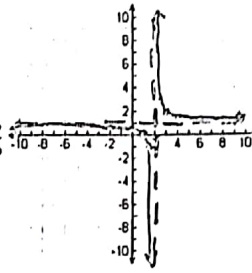
R:  $\{y | y \neq -1\}$



2.  $y = \frac{1}{x-2} + 1$

D:  $\{x | x \neq 2\}$

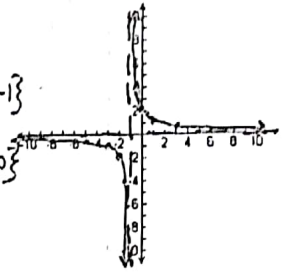
R:  $\{y | y \neq -1\}$



3.  $y = \frac{2}{x+1}$

D:  $\{x | x \neq -1\}$

R:  $\{y | y \neq 0\}$



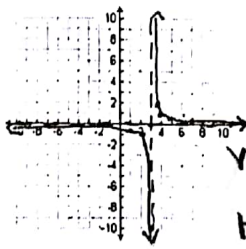
Directions: Find points of discontinuity, the domain, and x- and y-intercepts of each rational function.

4.  $y = \frac{x+3}{x^2-9} = \frac{x+3}{(x-3)(x+3)} = \frac{1}{x-3}$

D:  $\{x | x \neq 3\}$

R:  $\{y | y \neq 0, \frac{1}{0}\}$

V.A.  $x=3$  Hole: when  $x=3$   
H.A.  $y=0$

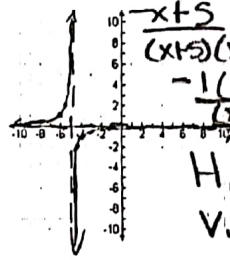


5.  $y = \frac{5-x}{x^2-25} = \frac{-1}{x+5}$

D:  $\{x | x \neq -5\}$

R:  $\{y | y \neq 0, -1/0\}$

H.A.  $y=0$  Hole: when  $x=5$   
V.A.  $x=-5$



Simplify. State any restrictions on the variables.

6.  $\frac{5x^2y}{10xy^4} = \frac{x}{2y^3}$   $\{x | x \neq 0\}$   
 $\{y | y \neq 0\}$

7.  $\frac{4d^2+8d}{2d} = \frac{4d(d+2)}{2d} = 2(d+2)$   
 $\{d | d \neq 0\}$

8.  $\frac{x^2+9x+18}{x+6} = \frac{(x+6)(x+3)}{x+6} = x+3$   
 $\{x | x \neq -6\}$

9.  $\frac{x^2-2x-8}{x+3} \div \frac{x-4}{x+3} = \frac{(x-4)(x+2)}{x+3} \cdot \frac{x+3}{x-4} = x+2$   
 $\{x | x \neq -3, 4\}$

10.  $\frac{3x+1}{x^2-x-6} + \frac{6x^2+11x+3}{x^2+4x+4} = \frac{3x+1}{(x-3)(x+2)} \div \frac{(3x+1)(x+3)}{(x+2)^2}$   
 $= \frac{(3x+1)(x+2)^2}{(3x+1)(x+2)(x-3)(2x+3)} = \frac{x+2}{(x-3)(2x+3)}$   
 $\{x | x \neq -2, -\frac{3}{2}, -\frac{1}{3}, 3\}$

11.  $\frac{3x^4-x^3-2x^2}{6x^2-2x-4} = \frac{x^2(3x^2-x-2)}{2(3x^2-x-2)} = \frac{x^2}{2}$   
 $3x^2-3x+2x-2$   
 $3x(x-3)$   $\{x | x \neq -\frac{2}{3}, 1\}$

12.  $\frac{2x^2+5x-3}{x^2-4x} \cdot \frac{2x^3-8x^2}{x^2+6x+9} = \frac{(2x-1)(x+3)}{x(x-4)} \cdot \frac{2x^2(x-4)}{(x+3)^2}$   
 $= \frac{2x(2x-1)}{x+3}$   
 $\{x | x \neq -3, 0, 4\}$

13.  $\frac{x^2+3x+2}{x-1} \cdot \frac{1-x}{x+2} = \frac{(x+2)(x+1)}{x-1} \cdot \frac{-(x-1)}{x+2}$   
 $= -(x+1)$   
 $\{x | x \neq -2, 1\}$

Simplify each sum or difference. State any restrictions on the variables.

$$14. \frac{6x+1}{x+2} + \frac{2x-5}{2x+4} = \frac{(6x+1)(2x+4) + (2x-5)(x+2)}{(x+2)(2x+4)}$$

$$= \frac{12x^2 + 26x + 4 + 2x^2 - x - 10}{2(x+2)^2} = \frac{14x^2 + 25x - 6}{2(x+2)^2}$$

$$15. \frac{8}{x^2-25} + \frac{9}{x-5} = \frac{8 + 9(x+5)}{(x-5)(x+5)} = \frac{9x+53}{(x-5)(x+5)}$$

$\{x \mid x \neq \pm 5\}$

$$16. \frac{x-3}{x^2+3x} + \frac{7}{x+3} = \frac{(x-3)(x+3)}{x(x+3)} + \frac{7}{x+3} = \frac{x-3+7x}{x(x+3)} = \frac{8x-3}{x(x+3)}$$

$\{x \mid x \neq -3, 0\}$

$$17. \frac{3x}{x^2+5x+6} - \frac{2x}{x^2+8x+16} = \frac{3x(x+4)^2 - 2x(x+5)(x+4)}{(x+5)(x+4)^2(x+4)}$$

$$= \frac{3x^2 + 24x^2 + 48x - 2x^3 - 10x^2 - 12x}{(x+4)^2(x+5)(x+4)}$$

$$= \frac{x(x^2 + 14x + 60)}{(x+4)^2(x+5)(x+4)}$$

$\{x \mid x \neq \pm 4, -5, -1\}$

$$18. \frac{2}{x^2-1} - 3 = \frac{2 - 3x^2 + 3}{(x-1)(x+1)} = \frac{-3x^2 + 5}{x^2-1}$$

$\{x \mid x \neq \pm 1\}$

$$19. \frac{2x}{x-5} - \frac{x}{x+7} = \frac{2x(x+7) - x(x-5)}{(x-5)(x+7)} = \frac{x^2 + 19x}{(x-5)(x+7)}$$

$\{x \mid x \neq -7, 5\}$

Solve each equation. Check each solution.

$$20. \frac{x}{4} = \frac{x+1}{3}$$

$$3x = 4x + 4$$

$$x = -4$$

$$21. \frac{2}{x^2-1} = \frac{4}{x+1}$$

$$2x+2 = 4x^2-4$$

$$4x^2 - 2x - 6 = 0$$

$$2x^2 - x - 3 = 0$$

$$(2x-3)(x+1) = 0$$

$x = \frac{3}{2}, -1$

$$22. \frac{3x}{5} + \frac{4}{x} = \frac{4x+1}{5} \quad |cd: 5x$$

$$3x^2 + 20 = 4x^2 + x$$

$$x^2 + x - 20 = 0$$

$$(x+5)(x-4) = 0$$

$x = -5, 4$

$$23. \frac{3x}{x-2} = 4 + \frac{x}{5}$$

$$15x = 20x - 40 + x^2 - 2x$$

$$0 = x^2 + 3x - 40$$

$$0 = (x+8)(x-5)$$

$x = -8, 5$

$$24. x + \frac{x}{4} - \frac{x}{5} = 21$$

$$20x + 5x - 4x = 420$$

$$21x = 420$$

$x = 20$

$$25. \frac{3}{x+4} + \frac{5}{4} = \frac{18}{x+4}$$

$$12 + 5(x+4) = 72$$

$$x+4 = 12$$

$x = 8$

~~26. It would take an apprentice house painter 1.5 h longer than his supervisor to paint an apartment. If they work together, they can complete the job in 4 h. About how long would it take the apprentice to complete the job working alone? Round your answer to the nearest tenth of an hour.~~

~~27. A master roofer can cover a garage in 1 h less than her new assistant. If they work together, they can complete the job in 7.75 h. How long would it take the assistant to complete the job working alone?~~