

Chapter 8 Review

Transformations: Write the transformations of the parent function  $y = \frac{1}{x}$  to the new function. Then graph.

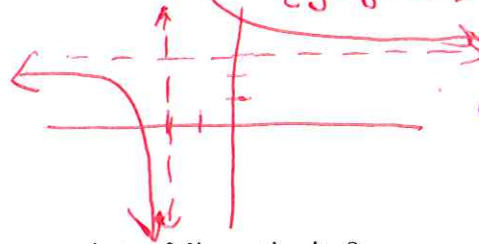
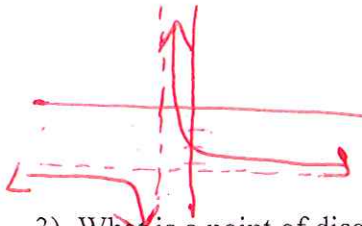
1)  $y = \frac{1}{x+1} - 3$

Shift left/right  
Shift up/down

Transformations: *shift left 1, shift down 3*  
Vertical Asymptote:  $x = -1$   
Horizontal Asymptote:  $y = -3$   
Domain:  $\{x | x \neq -1\}$   
Range:  $\{y | y \neq -3\}$

2)  $y = \frac{5}{x+2} + 3$

Transformations: *stretch bfo 5, shift left 2, shift up 3*  
Vertical Asymptote:  $x = -2$   
Horizontal Asymptote:  $y = 3$   
Domain:  $\{x | x \neq -2\}$   
Range:  $\{y | y \neq 3\}$



*use table to graph.*

3) What is a point of discontinuity? What occur at points of discontinuity?

*Look in notes! I'm not telling you*

What types of graphs are continuous? What types of graphs are discontinuous?

*same as above.*

Identify the holes and vertical asymptotes of each.

*Factor* 4)  $f(x) = \frac{x^2 - 2x}{x^2 - 2x - 3} = \frac{x(x-2)}{(x-3)(x+1)}$

*Holes: none VA: x=3, -1*

Fill in the information below.

6)  $y = \frac{x^2 - 4}{x + 2} = \frac{(x+2)(x-2)}{(x+2)}$

H.A.: *NONE*

V.A.: *NONE*

Holes:  $x = -2$

Domain:  $\{x | x \neq -2\}$

x-intercepts: *2*

y-intercepts: *-2*

5)  $f(x) = \frac{-3x + 12}{x^3 - 6x^2 + 8x} = \frac{-3(x-4)}{x(x-4)(x-2)}$

*Hole: x=4 VA: x=0, 2*

7)  $y = \frac{5x^3 + 2x}{2x^5 - 4x^3} = \frac{x(5x^2 + 2)}{2x^3(x^2 - 2)}$

H.A.:  $y = 0$

V.A.:  $x = \pm\sqrt{2}$

Holes:  $x = 0$

Domain:  $\{x | x \neq 0, \sqrt{2}, -\sqrt{2}\}$

x-intercepts: *NONE (cannot square root a negative)*

y-intercepts: *NONE (0 is undefined)*

Simplify each and state the excluded values. *Factor + reduce*

8)  $\frac{18p}{21p^2 + 27p}$

$\frac{18p}{3p(7p+9)} = \frac{6}{7p+9}$   
 $p \neq 0, -9/7$

9)  $\frac{n+5}{12n^3+28n^2} \cdot \frac{12n^3+28n^2}{10n^3-70n^2}$

$\frac{n+5}{4n^2(3n+7)} \cdot \frac{4n^2(3n+7)}{10n^2(n-7)}$   
 $\frac{n+5}{10n^2(n-7)}$   
 $n \neq 0, 7, -7/3$

10)  $\frac{r^2+2r-15}{r^2-r-56} \cdot \frac{r+7}{4r^2-12r}$

$\frac{(r+5)(r-3) \cdot (r+7)}{(r-8)(r+7) \cdot 4r(r-3)}$   
 $\frac{r+5}{4r(r-8)}$   $r \neq 8, -7, 0, 3$

11)  $\frac{5a^3+50a^2}{9a^2} \div \frac{a^2-100}{2a^3-20a^2}$

$\frac{5a^2(a+10)}{9a^2} \cdot \frac{2a^2(a-10)}{(a+10)(a-10)}$   
 $\frac{10a^2}{9}$   $a \neq 0, 10, -10$

12)  $\frac{6n+18}{n^2-9} \div \frac{6n-6}{4n^3-12n^2}$

$\frac{6(n+3)}{(n+3)(n-3)} \cdot \frac{4n^2(n-3)}{4n^2(n-1)}$   
 $\frac{4n^2}{n-1}$   $n \neq 0, 3, -3, 1$

13) A field has a length of  $\frac{x^2+3x+2}{x-4}$  feet and a width of  $\frac{x^2+x-20}{x^2+5x+6}$  feet. What is the area of the field in simplified form?

$\frac{x^2+3x+2}{x-4} \cdot \frac{x^2+x-20}{x^2+5x+6}$   
 $\frac{(x+2)(x+1)}{(x-4)} \cdot \frac{(x+5)(x-4)}{(x+3)(x+2)}$   
 $\frac{(x+1)(x+5)}{(x+3)}$   $A = lw$

14) Suppose that y varies inversely with x. x = 30 when y = 2. Find y when x = 5.

$y = \frac{k}{x}$   
 $2 = \frac{k}{30}$   
 $k = 60$   
 $y = \frac{60}{x}$   
 $y = \frac{60}{5}$   
 $y = 12$

15) Write your own set of 4 ordered pairs in which y varies directly with x.

$y = kx$   
 I pick  $y = 2x$  (you can pick k to be anything!)  
 $(0,0), (1,2), (2,4), (3,6)$

16)  $z$  varies jointly with  $x$  and  $y$ . When  $x = 2$  and  $y = 2, z = 7$ . Find  $z$  when  $x = 4$  and  $y = 8$ .

$$z = kxy$$

$$7 = 2(2)k$$

$$k = \frac{7}{4}$$

$$z = \frac{7}{4}xy$$

$$z = \frac{7}{4}(4)(8)$$

$$z = 56$$

17) Write an equation for the translation of  $y = \frac{4}{x}$  that has a horizontal asymptote at  $y = 3$  and a vertical asymptote at  $x = 4$ .

↑ up 3      ↑ right 4

$$y = \frac{4}{x-4} + 3$$

Simplify each expression.

18)  $\frac{n-1}{n^2-9} + \frac{-5}{n+3}$   
 (n+3)(n-3)

$$\frac{n-1}{(n+3)(n-3)} + \frac{-5n+15}{(n+3)(n-3)}$$

$$\frac{-4n+14}{(n+3)(n-3)} = \frac{-2(n-7)}{(n+3)(n-3)}$$

$n \neq 3, -3$

19)  $\frac{4}{x-3} + \frac{4x+1}{x^2+x-12}$   
 (x+4)(x-3)

$$\frac{4x+16}{(x+4)(x-3)} + \frac{4x+1}{(x+4)(x-3)} = \frac{8x+17}{(x+4)(x-3)}$$

$x \neq -4, 3$

Solve each equation. Remember to check for extraneous solutions.

20)  $\frac{x-3}{6x^2} = \frac{1}{6x} + \frac{3}{x}$

$$\frac{x-3}{6x^2} = \frac{x}{6x^2} + \frac{18x}{6x^2}$$

$$x-3 = x+18x$$

$$-3 = 18x$$

$$x = -\frac{1}{6}$$

21)  $\frac{1}{a^2+5a} = \frac{1}{a+5} + \frac{4}{a^2+5a}$   
 $a(a+5)$        $a(a+5)$

$$\frac{1}{a(a+5)} = \frac{a}{a(a+5)} + \frac{4}{a(a+5)}$$

$$1 = a+4$$

$$a = -3$$

22)  $\frac{1}{m-6} + \frac{-m^2}{m^2-7m+6} = \frac{m-5}{m^2-7m+6}$   
 (m-6)(m-1)      (m-6)(m-1)

$$\frac{m-1}{(m-6)(m-1)} + \frac{-m^2}{(m-6)(m-1)} = \frac{m-5}{(m-6)(m-1)}$$

$$\rightarrow \frac{m-1-m^2}{-m+1+m^2} = \frac{m-5}{-m+m^2+1}$$

$$0 = m^2 - 4$$

$$0 = (m+2)(m-2)$$

$$m = \pm 2$$

Simplify each expression.

23)  $\frac{16}{x} \cdot \frac{x-2}{x^2} + \frac{1}{x}$

$$\frac{16x}{2x-2} = \frac{16x}{2(x-1)} = \frac{8x}{x-1}$$

24)  $\frac{1}{2} + \frac{4}{x-4}$   
 $\frac{16}{x-4} + \frac{x-4}{3}$

$$\frac{3x-12}{6(x-4)} + \frac{24}{6(x-4)}$$

$$\frac{2x^2-8x-8x+32}{6(x-4)} + \frac{2x^2-16x+32}{6(x-4)}$$

#24 con.

$$\frac{3x-12+24}{96+2x^2-16x+32} = \frac{3x+12}{2x^2-16x+128} = \boxed{\frac{3(x+4)}{2(x^2-8x+64)}}$$