

Chapter 8 Review

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

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

left 1  
down 3

Transformations:

Vertical Asymptote: VA @  $x = -1$

Horizontal Asymptote: HA @  $y = -3$

Domain:  $\mathbb{R}; x \neq -1$

Range:

$\mathbb{R}; y \neq -3$

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

Stretch by 5

left 2

up 3

Transformations:

Vertical Asymptote:  $x = -2$

Horizontal Asymptote:  $y = 3$

Domain:  $\mathbb{R}; x \neq -2$

Range:

$\mathbb{R}; y \neq 3$

Identify the holes and vertical asymptotes of each.

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

none

VA @  $x = 3$  &  $-1$

Fill in the information below.

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

H.A.: none  $m > n$

V.A.: none

Holes: -2

Domain:  $\mathbb{R} x \neq -2$

x-intercepts:  $x = 2$

y-intercepts:  $y = -2$

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

$x(x^2 - 6x + 8)$

Holes @  $x = 4$

VA @  $x = 0$  &  $2$

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

H.A.:  $y = 0$

V.A.:  $x = 0, \pm \sqrt{2}$

Holes: none

Domain:  $\mathbb{R} x \neq 0$

x-intercepts:  $x = \text{none}$

y-intercepts:  $y = \text{none}$

Simplify each and state the excluded values.

$$7) \frac{18p}{21p^2 + 27p} \quad \frac{18p}{3p(7p+9)}$$

$$\boxed{\frac{6}{(7p+9)}}$$

$$8) \frac{k-1}{2k^2 - 2k} \quad \frac{(k-1)}{2k(k-1)}$$

$$\boxed{\frac{1}{2k}}$$

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

$$\frac{(n+5)}{4n^2(n+7)} \cdot \frac{4n^2(n+7)}{10n^2(n-7)}$$

$$\boxed{\frac{(n+5)}{10n^2(n-7)}}$$

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

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

$$\boxed{\frac{(r+5)}{4r(r-8)}}$$

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

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

$$\frac{10a^4}{9a^2} = \boxed{\frac{10a^2}{9}}$$

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

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

$$\frac{4n^2}{(n-1)} = \boxed{\frac{4n^2}{(n-1)}}$$

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?  $A = l \times w.$

$$\frac{(x+2)(x+1)}{(x-4)} \cdot \frac{(x+5)(x-4)}{(x+3)(x+2)} = \boxed{\frac{(x+1)(x+5)}{(x+3)}}$$

14) Suppose that  $x$  and  $y$  vary inversely.  $x = 30$  when  $y = 2$ . Find  $y$  when  $x = 5$ .

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

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

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  $x = 4$ .

Simplify each expression.

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

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

$$\frac{n-1}{(n+3)(n-3)} - \frac{5(n-3)}{(n+3)(n-3)} = \frac{-4n+14}{(n+3)(n-3)}$$

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

$$\frac{(x+4)4}{(x+4)(x-3)} + \frac{4x+1}{(x+4)(x-3)}$$

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

$$\boxed{\frac{8x+17}{(x+4)(x-3)}}$$

Solve each equation. Remember to check for extraneous solutions.

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

$$x-3 = 1x + 18x$$

$$x-3 = 19x$$

$$\frac{-3}{18} = \frac{18x}{18}$$

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

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

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

$$1 = 1a + 4$$

$$-3 = 1a$$

$$\boxed{a = -3}$$