

Chapter 12. Final Exam Practice Questions.

Main topic #1: Inverse variation

- (1) How can you tell if two variables show inverse variation?

$$y = \frac{a}{x} \text{ (also } xy = a)$$

- (2) The variables x and y vary inversely, and $y = 8$ when $x = -5$. First, write an inverse variation equation that relates x and y . Then, find the value of y when $x = 4$.

$$xy = a$$

$$(-5)(8) = -40$$

$$a = -40$$

$$y = \frac{-40}{x}$$

$$y = \frac{-40}{4}$$

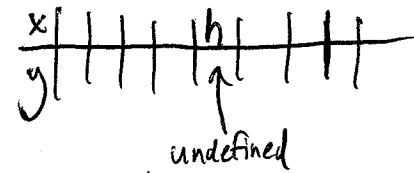
$$y = -10$$

Main topic #2: Graph rational functions

- (3) What are the important parts of a rational function that you need to consider when graphing?

$$y = \frac{a}{x-h} + k$$

Horizontal asymptote: $y = k$
 Vertical asymptote: $x = h$



- (4) Graph $y = \frac{-6}{x} + 5$

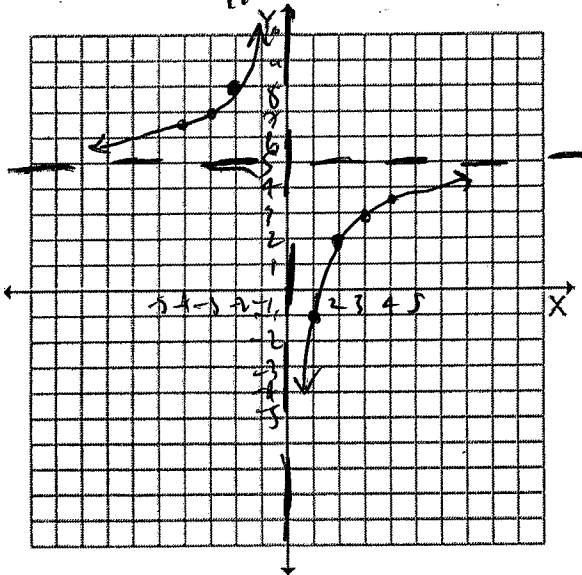
$$a = -6$$

$$h = 0$$

$$k = 5$$

Domain: \mathbb{R} except 0

Range: \mathbb{R} except 5



x	-4	-3	-2	-1	0	1	2	3	4
y	6.5	7	8	11	und	-1	2	3	3.5

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

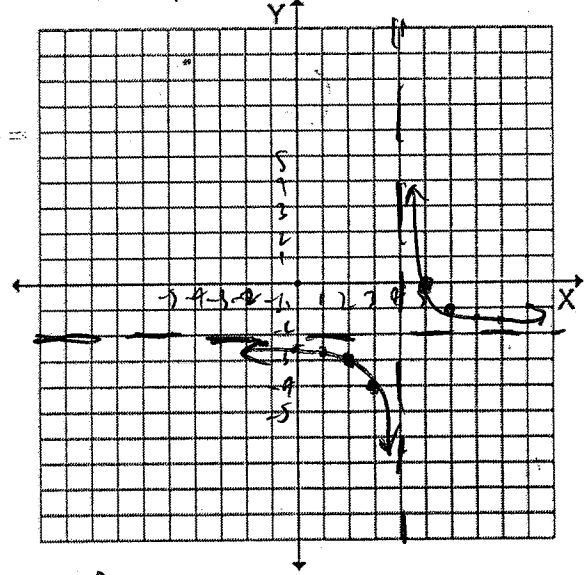
$$a = 2$$

$$h = 4$$

$$k = -2$$

Domain: \mathbb{R} except 4

Range: \mathbb{R} except -2



x	0	1	2	3	4	5	6	7	8
y	-2.2	-2.3	-3	-4	und	0	-1	-1.5	-1.2

Main topic #3: Divide polynomials

(6) $(3x^3 - 5x^2 + 10x - 3) \div (3x + 1)$

$$\begin{array}{r} x^2 - 2x + 4 \\ 3x+1 \overline{) 3x^3 - 5x^2 + 10x - 3} \\ \underline{-3x^3 + x^2} \\ -6x^2 + 10x \\ \underline{-6x^2 - 2x} \\ 12x - 3 \\ \underline{-12x + 4} \\ -7 \end{array}$$

$x^2 - 2x + 4 + \frac{-7}{3x+1}$

Main topic #4: Simplify rational expressions

(7) Simplify: $\frac{2m^2 + 8m - 24}{3m^3 + 24m^2 + 36m}$

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

$$\frac{2(m-2)}{3m(m+2)}$$

Main topic #5: Multiply/divide rational expressions

(8) $\frac{3(r^2 - 4)}{r - 2} \div \frac{2r^2 + 7r + 6}{2r^2 - r - 6}$

$$\frac{3(r+2)(r-2)}{(r-2)} \cdot \frac{(2r+3)(r-2)}{(2r+3)(r+2)}$$

$$3(r-2)$$

(9) $(\frac{2y^6}{6y^3 + 8y^2})(3y + 4)$

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

$$y^4$$

Main topic #6: Add/subtract rational expressions

(10) $\frac{3}{c^2 - 9} - \frac{2}{2c^2 - 3c - 9}$

$$\frac{3}{(c+3)(c-3)} - \frac{2}{(2c+3)(c-3)} \cdot \frac{(c+3)}{(c+3)}$$

$$\frac{6c+9}{(2c+3)(c+3)(c-3)} - \frac{2c+6}{(2c+3)(c+3)(c-3)} = \frac{4c+3}{(2c+3)(c+3)(c-3)}$$

Main topic #7: Solve rational equations

(11) $\frac{1}{w+2} - \frac{2}{w+3} = \frac{6}{w^2 + 5w + 6}$

$$\frac{1}{(w+2)(w+3)} - \frac{2(w+2)}{(w+2)(w+3)} = \frac{6}{(w+2)(w+3)}$$

$$w+3 - 2(w+2) = 6$$

$$w+3 - 2w - 4 = 6$$

$$\begin{aligned} -w - 1 &= 6 \\ +1 &+1 \\ -w &= 7 \end{aligned}$$

$$w = -7$$