BECA / Huson / Algebra 2: Polynomial & Rational Functions Name: SOLUTIONS
9 January 2024

2.27 Homework: Rational expressions exam review

1. Use polynomial long division to find an expression of the form $ax+b+\frac{c}{x+d}$ with a, b, c, d integers that is equivalent to $\frac{3x^3+19x^2+15x}{x^2+4x}$ for $x \neq -4$ or 0.

$$\begin{array}{r} 3x+7 \\ x^2+4x \;\big|\; 3x^3+19x^2+15x \\ \underline{3x^3+12x^2} \\ 7x^2+15x \\ \underline{7x^2+28x} \\ -13x \end{array}$$

$$= 3x+7-\frac{13x}{x^2+4x}$$

$$= 3x+7-\frac{13}{x+4}$$

A2-F.BF.2 Write arithmetic and geometric sequences with recursive formulas

2. Write a recursive definition of the sequence $a_1 = 2$, $a_2 = 6$, $a_3 = 18$, $a_4 = 54, \ldots$

$$a_1 = 2$$

$$a_n = 3\,a_{n-1}$$

3. A geometric sequence begins $5, 10, 20, \ldots$.

   (a) Write the first six terms of the sequence. 5, 10, 20, 40, 80, 160

   (b) Find the common ratio r. $r = 2$

   (c) Find the sum of the first six terms of the sequence.

$$S = 5\left(\frac{1-2^6}{1-2}\right) = 315$$

   (d) Find the sum of the first 20 terms of the sequence.

$$S = 5\left(\frac{1-2^{20}}{1-2}\right) = 5,242,875$$

$S = 5+10+20+\ldots+$

4. Find all values of x that make the equation true.

$$x(x-6)\frac{x-3}{x} = \frac{2}{x-6} \quad (x)(x-6)$$

$$(x-6)(x-3) = 2x$$

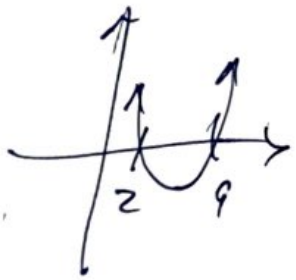
$$x^2 - 9x + 18 - 2x = 0$$

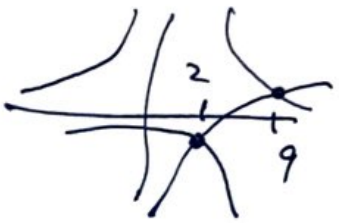
$$x^2 - 11x + 18 = 0$$

$$(x-2)(x-9) = 0$$

$x = 2, 9$

1 18
2 9
3 6



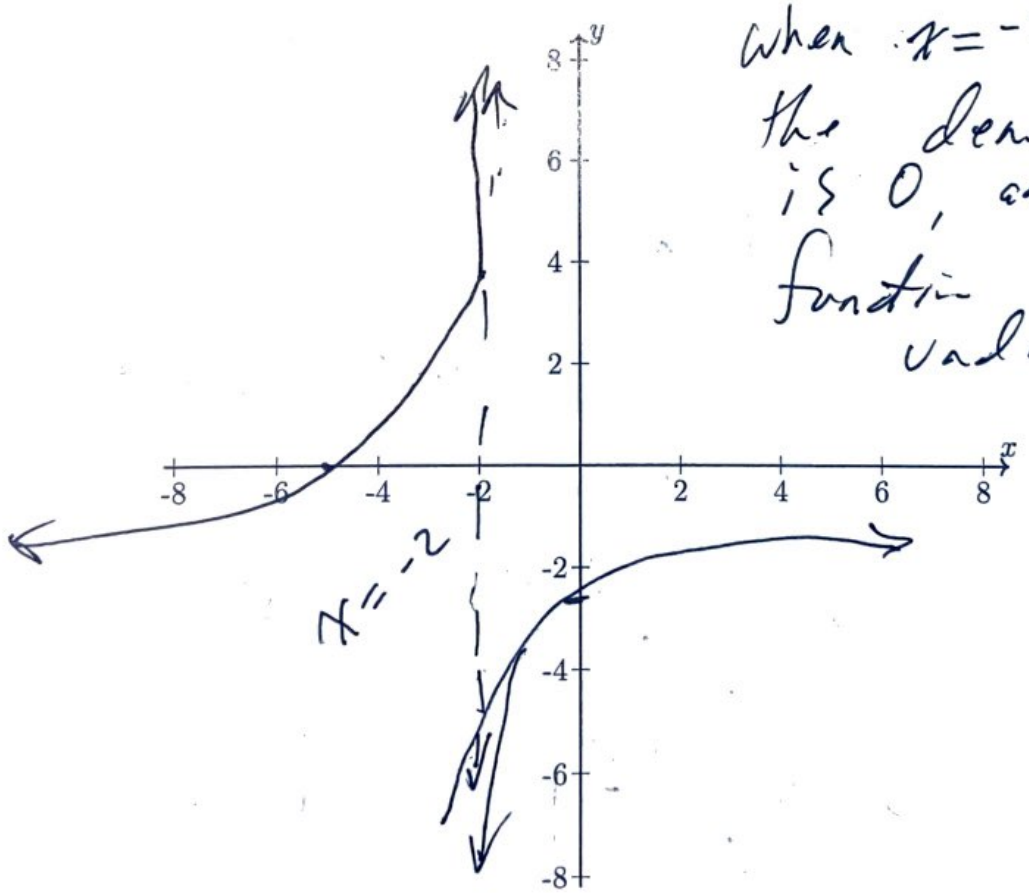


5. Given the rational function $r(x) = -2 + \dfrac{x-1}{x+2}$.

(a) Sketch a graph of the function.

(b) Mark the vertical asymptote as dotted line and label it with its equation.

(c) Explain why the asymptote is located there.



when $x = -2$ the denominator is 0, and the function is undefined