2024 Fall Math 140 Week-In-Review

Week 9: Sections 5.3 and 5.4

Some Key Words and Terms: Domain, Rational Functions, Holes, Vertical Asymptotes, Intercepts, Simplifying Rational Expressions, Difference Quotient, Power/Radical Functions, Converting Exponents, Conjugate, Rationalizing.

Domain:

Rational Function:

Holes:

Vertical Asymptotes:

Intercepts:

Simplifying Rational Expressions:

Difference Quotient:

Power/Radical Functions:

Converting Exponents:

Conjugate:

Rationalizing:

Examples:

1. Determine the domain, in interval notation, for the following functions.

   (a) $f(x) = \dfrac{-x^3 + 5x^2}{x^2 - 7x + 10}$

   (b) $g(x) = 8\sqrt[3]{5x+2} + 3\sqrt[8]{2x+5}$

   (c) $h(x) = \dfrac{2\sqrt{9-8x}}{x^2 - 5}$

   (d) $j(x) = \dfrac{5x^2 + 6x - 9}{\sqrt[4]{3x-7}}$

2. For the functions given, determine all intercepts and any holes or vertical asymptotes for the function.

   (a) $f(x) = \dfrac{-x^3 + 5x^2}{x^2 - 7x + 10}$

   (b) $h(x) = \dfrac{(x-3)(x+1)^2(x+5)}{x(x+1)(x-5)^3}$

3. Simplify the following rational expressions. Express your answer using only positive exponents.

   (a) $\dfrac{x+3}{x-2} - \dfrac{2x}{x-1}$

(b) $\dfrac{x^3 - 9x}{x^{-}6x + 8} \div \dfrac{x^2 - x - 6}{2x^2 - 8}$

(c) $\left(\dfrac{(2xyz)3}{22x^{-2}y^5z}\right)^{-2}$

4. For the following functions, convert from radical form to power form. Express your answer without denominators.

   (a) $f(x) = 4\sqrt[3]{(x^2 - 6x)^7}$

   (b) $g(x) = \dfrac{7}{\sqrt[6]{(8 - 3x)^5}}$

5. For the following functions, convert from power form to radical form. Express your answer without negative exponents.

   (a) $f(x) = x^{1/2} - 3x^{-1/2} + (7x)^{-5/4}$

   (b) $g(x) = x^{3/4}(x^2 + 2)^{-3/2}$

6. For the following expressions, determine the conjugate.

   (a) $x - 5$

   (b) $2x - \sqrt{x}$

   (c) $\sqrt{x+3} + \sqrt{11}$

7. For the given functions, setup and fully simplifly the difference quotient.

   (a) $f(x) = 2x^2 - 5x$

(b) $g(x) = \dfrac{x+2}{x}$

(c) $j(x) = \sqrt{2x - 1}$