Section 5.3:Rational Functions

- Domain - denominator can not be zero
- Rationalizing
- Difference Quotient

Pr 1. Which of the following are rational functions?

(a) $f(x) = 3x^2 + 5x - 2$

(b) $g(x) = x^{-1} + 2x$

(c) $h(x) = \frac{3x-1}{2x+5}$

(d) $j(x) = 2^x$

(e) $h(x) = x^{3.2}$

Pr 2. Compute each of the following, and simplify completely:

(a) $\left(\dfrac{(x+2)^2}{x^2-9}\right)\left(\dfrac{7(x+9)}{(x-9)}\right)$

(b) $\dfrac{4x^3-12x^2+9x}{x^2-49} \div \dfrac{10x^2-15x}{x^2+4x-21}$

(c) $\dfrac{2}{(x-2)(x+4)} - \dfrac{x+5}{(x-2)(x+2)}$

Pr 3. State the domain of each rational function. Then classify each each domain restriction as the location of a hole or vertical asymptote on the graph of the function. Finally, compute the $x-$ and $y-$intercepts, if possible, of each function.

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

(b) $g(x) = \dfrac{(x+3)(x-2)}{(x-2)(x+2)}$

(c) $h(x) = \dfrac{-2x}{6x^2 - 8x}$

(d) $j(x) = \dfrac{3x^2 - 6x + 3}{x^2 - 9}$

Pr 4. Compute and simplify the difference quotient for each function.

(a) $f(x) = -x^2 + 5x - 4$

(b) $g(x) = \dfrac{3x}{2x - 2}$

Section 5.4: Power and Radical Functions

- Power Functions
- Radical Functions
- Domain of Radical Functions based on Index
- Conjugate
- Rationalizing a numerator or denominator

Pr 1. Which of the following are power or radical functions?

(a) $f(x) = 3x^2 + 5x - 2$

(b) $g(x) = x^{-3}$

(c) $h(x) = \sqrt{x^7}$

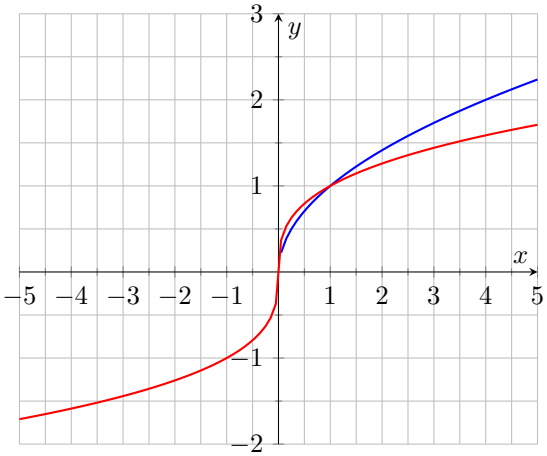
(d) $j(x) = 2^x$

(e) $h(x) = x^{3.2}$

(f) Identify the graph of the parent function:

(i) $f(x)\sqrt{x}$.

(ii) $g(x) = x^{1/3}$.



Pr 2. Rewrite each radical in its equivalent exponent (power) form, assuming x is in the domain of each function.

(a) $\sqrt[5]{-2x^2+4x}$

(b) $6\sqrt{3x^2-8x+2}$

(c) $\sqrt[4]{(2-5x)^3}$

Pr 3. Rewrite each exponent function in its equivalent radical form, assuming x is in the domain of each function.

(a) $(x^2+3x)^{7/11}$

(b) $(3x+8)^{9/13}$

(c) $2(5x-3)^{7/3}$

Pr 4. State the domain of each function. Write your answer using interval notation. Then determine the x- and y-intercepts, if possible.

(a) $f(x) = \sqrt[6]{3x - 28}$

(b) $g(x) = 2\sqrt[5]{x - 5}$

(c) $h(x) = 5(2x - 5)^{5/12}$

Pr 5. State the domain of each function. Write your answer using interval notation.

(a) $f(x) = (3x - 4)^{-4/3}$

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

(c) $h(a) = \dfrac{3a}{\sqrt{a+2} - 5}$

Pr 6. State the conjugate of each of the following expressions.

(a) $2 + \sqrt{x}$

(b) $2 + 3\sqrt{2x - 5}$

Pr 7. Rationalize each numerator or denominator, as appropriate, and simplify the expression.

(a) $\dfrac{3x}{\sqrt{x} - 3}$

(b) $\sqrt{3x - 2} + 5$

Pr 8. Compute and simplify the difference quotient for $F(x) = 3\sqrt{2-x}$.