PreCalc 11 - Chp 7 Review/Ref Sheet

Note Title 2015-09-24

A rational expression has the form: $\frac{P(x)}{Q(x)}$ where $P(x)$ and $Q(x)$ are polynomials. Recall that polynomials have non-negative exponents for variables.

Whenever we use rational expressions, we need to check for NPV's. For equivalent RE's, we may add additional NPV's, but we never remove any original NPV's! The NPV's are the zeroes of the denominator.

Important: We say "NPV's: $x = 0$" use actual values.
not "NPV's: $x \neq 0$"
for domains we say "$x \neq 0$". Domains are the permissible values, so domain and NPV's are opposites!

For divide, we add NPV's when reciprocating divisor.

eg) $\frac{(2x-3)(x+4)}{(2x+3)(2x-3)} \div \frac{(x+4)(3x+1)}{(2x+5)(2x+3)}$

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

$x \neq -\frac{3}{2}, \frac{3}{2}, -\frac{5}{2}, -4, -\frac{1}{3}$

NPV's: $x = -\frac{3}{2}, \frac{3}{2}, -\frac{5}{2}, -4, -\frac{1}{3}$

Remember to factor trinomials or constant factors to find NPV's or factors to simplify.

eg) $\frac{(x^2-x-6)}{(x^2+6x+8)} \div \frac{(x^2-5x+6)}{(x^2+x-12)}$

$= \frac{\cancel{(x-3)}\cancel{(x+2)}}{\cancel{(x+4)}\cancel{(x+2)}} \cdot \frac{\cancel{(x+4)}(x-3)}{\cancel{(x-3)}(x-2)} = \frac{x-3}{x-2}$

$x \neq -4, -2, 3, 2$

NPV's: $x = -4, -2, 3, 2$

Just like adding and subtracting fractions, we need a common denominator.

$\frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$

$\frac{1}{x} + \frac{1}{y} = \frac{y}{xy} + \frac{x}{xy} = \frac{x+y}{xy}$

NPV's: $x = y = 0$

If there are more than 2 terms, you must find the LCD of all terms. It's easier to find what is missing from the other denominators.

eg) $\dfrac{3x+y}{12x^2y} - \dfrac{2x-3y}{4xy^2} + \dfrac{3}{3xy}$ $\quad$ LCD $= 12x^2y^2$

$= \dfrac{(3x+y)}{12x^2y}\dfrac{y}{y} - \dfrac{(2x-3y)}{4xy^2}\dfrac{3x}{3x} + \dfrac{3}{3xy}\dfrac{4xy}{4xy}$ $\quad$ NOT FINISHED!

For polynomial divisors: we need to factor the polynomial's and look for the LCD.

eg) $\dfrac{3x+1}{x^2+3x+2} - \dfrac{2x-3}{x^2-x-6}$

$= \dfrac{3x+1}{(x+2)(x+1)} - \dfrac{2x-3}{(x-3)(x+2)}$ $\quad$ LCD: $(x+2)(x+1)(x+3)$

NOT FINISHED!

Solving Rational Equations

As long as you understand the previous sections, solving is nothing more than adding the "=" and another expression. We want to use the LCD, then multiply both sides by the LCD which will cancel out the denominator. Then perform algebra as usual.

Make sure you check the solutions with the NPV's to see if the solutions are valid.

distance = velocity · time $\Rightarrow v = \dfrac{d}{t}$ or $t = \dfrac{d}{v}$

area of rectangle $= l \cdot w \Rightarrow l = \dfrac{A}{w}$ or $w = \dfrac{A}{l}$

work = rate · time $\Rightarrow t = \dfrac{W}{r}$ or $r = \dfrac{W}{t}$

cost = price · units $\Rightarrow p = \dfrac{C}{u}$ or $u = \dfrac{C}{p}$

$\%$ concentration $= \dfrac{\text{pure}}{\text{pure} + \text{neutral}} \times 100\%$