Math 115

Spring 2017

Lecture 24

① Simplify: $\dfrac{x^3-5x^2+6x}{x^4-4x^2} = \dfrac{x(x^2-5x+6)}{x^2(x^2-4)}$

$= \dfrac{\cancel{x}(x-2)(x-3)}{x^{\cancel{2}}(x+2)\cancel{(x-2)}} = \boxed{\dfrac{x-3}{x(x+2)}}$

② Find all the excluded values: $\dfrac{x^2-10}{3x^2-x-4}$

Restricted Values → Denom = 0, Solve

$3x^2 \boxed{-x} - 4 = 0$

$P=-12, S=-1$

$3, -4$

-12

$3x^2 \boxed{+3x - 4x} - 4 = 0$ → by Z.F.P.

$3x(x+1) - 4(x+1)$

$(x+1)(3x-4) = 0$

$x+1=0$ or $3x-4=0$

$\boxed{x=-1}$ $\quad \boxed{x=\frac{4}{3}}$

E.V.: $-1, 4/3$

Multiply

$$\frac{x^2+6x}{x^2+6x+9} \cdot \frac{x^2-9}{x^2+3x-18}$$

$$= \frac{x(x+6)}{(x+3)(x+3)} \cdot \frac{(x+3)(x-3)}{(x+6)(x-3)} = \boxed{\frac{x}{x+3}}$$

Divide:

$$\frac{3x^2-13x+4}{9x^2-1} \div \frac{x^2-16}{3x^2+x}$$

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

$$= \boxed{\frac{x}{x+4}}$$

$3x^2-13x+4$

$P=12$

$12 \quad S=-B$

$-12 \quad \xi \quad -1$

$=3x^2-12x-1x+4$

$=3x(x-4)-1(x-4)$

Adding / Subtracting like fractions

Same Denominator

Subtract:

$$\frac{2x}{x^2-25} - \frac{10}{x^2-25}$$

$$= \frac{2x-10}{x^2-25}$$

$$= \frac{2(x-5)}{(x+5)(x-5)} = \boxed{\frac{2}{x+5}}$$

$$\frac{A}{D} + \frac{B}{D} - \frac{C}{D}$$

$$= \frac{A+B-C}{D}$$

then reduce

Simplify: $\dfrac{x^2-2x+3}{x^2-4} + \dfrac{x+3}{x^2-4}$

$= \dfrac{x^2-2x+3+x+3}{x^2-4} = \boxed{\dfrac{x^2-x+6}{x^2-4}}$

Can not be reduced.

Simplify: $\dfrac{x^2+9x}{x+7} - \dfrac{4x+14}{x+7}$

$= \dfrac{x^2+9x-4x-14}{x+7} = \dfrac{x^2+5x-14}{x+7} = \dfrac{(x+7)(x-2)}{x+7}$

$= \boxed{x-2}$

Simplify: $\dfrac{3x-1}{x^2+5x-6} - \dfrac{2x-7}{x^2+5x-6}$

$= \dfrac{3x-1-(2x-7)}{x^2+5x-6}$

$= \dfrac{3x-1-2x+7}{x^2+5x-6} = \dfrac{x+6}{x^2+5x-6}$

$= \dfrac{1(x+6)}{(x+6)(x-1)}$

$= \boxed{\dfrac{1}{x-1}}$

Now unlike fractions

$$\frac{5}{x^2-4}+\frac{2}{x^2+5x+6}$$

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

$$=\frac{5(x+3)+2(x-2)}{(x+2)(x-2)(x+3)}=\boxed{\frac{7x+11}{(x+2)(x-2)(x+3)}}$$

Simplify

$$\frac{x}{x^2-16}-\frac{4}{x^2-6x+8}=$$

$$\frac{x(x-2)}{(x+4)(x-4)(x-2)}-\frac{4(x+4)}{(x-2)(x-4)(x+4)}$$

LCD

$$=\frac{x(x-2)-4(x+4)}{(x+4)(x-4)(x-2)}=\frac{x^2-2x-4x-16}{(x+4)(x-4)(x-2)}$$

$$=\boxed{\frac{x^2-6x-16}{(x+4)(x-4)(x-2)}}=\boxed{\frac{(x+2)(x-8)}{(x+4)(x-4)(x-2)}}$$

Simplify:

$$\frac{x}{x^2-4} - \frac{5}{x^2-4x+4}$$

$$= \frac{x(x-2)}{(x-2)(x+2)(x-2)} - \frac{5(x+2)}{(x-2)(x-2)(x+2)}$$

$$= \frac{x^2-2x-5x-10}{(x-2)(x+2)(x-2)} = \frac{x^2-7x-10}{(x+2)(x-2)^2}$$

LCD

Solving Rational Equations

$$\frac{3}{x-5} - \frac{2}{x+5} = \frac{30}{x^2-25}$$

$LCD = (x-5)(x+5)$

5 is an E.V.

$$(x-5)(x+5)\cdot\frac{3}{x-5} - (x-5)(x+5)\cdot\frac{2}{x+5} = (x-5)(x+5)\cdot\frac{30}{x^2-25}$$

$$3(x+5) - 2(x-5) = 30$$

$$3x+15-2x+10=30$$

$$x+25=30 \rightarrow \boxed{x=5} \Rightarrow \boxed{\varnothing}$$

Since 5 is an E.V.