50. $\frac{2x}{2x}\cdot\frac{(2y-4)}{5xy^2}+\frac{(3-2x)}{10x^2y}\cdot\frac{y}{y}$

LCD is $10x^2y^2$

$\frac{1}{2}+\frac{1}{3}$

$=\frac{4xy-8x}{10x^2y^2}+\frac{3y-2xy}{10x^2y^2}$

$=\frac{4xy-8x+3y-2xy}{10x^2y^2}=\boxed{\frac{2xy-8x+3y}{10x^2y^2}}$

$x\neq 0, y\neq 0$

64. $\frac{x+2}{x+2}\cdot\frac{1}{x+2}-\frac{3x}{x^2+4x+4}$

$(x+2)(x+2)$

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

$=\boxed{\frac{-2(x-1)}{(x+2)(x+2)}}\quad\boxed{,x\neq -2}$

74. $\frac{(x+1)}{(x+3)} \cdot \frac{(x-3)}{x^2+x-12} - \frac{(x-3)}{x^2+7x+12} \div \frac{(x-3)}{(x-3)}$

$(x+4)(x-3)$ $\quad (x+4)(x+3)$

$= \frac{x^2+x+3x+3}{(x+3)(x+4)(x-3)} - \frac{(x^2-3x-3x+9)}{(x+4)(x+3)(x-3)}$

$4x \quad -(-6x)$

$= \frac{10x-6}{(x+3)(x+4)(x-3)}, x \neq -3, -4, 3$

$2(5x-3)$

80. $\frac{2x^2-2x}{x^2-2x-15} - \frac{2}{x+3} + \frac{x}{5-x} \cdot \frac{x+3}{x+3}$

$(x-5)(x+3) \quad \frac{x-5}{x-5} \quad -1(x-5)$

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

$= \frac{2x^2-2x-2x+10-x^2-3x}{(x-5)(x+3)}$

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

$= \frac{x-2}{x+3}, x \neq -3, 5$

$$\frac{x^2-12}{x^4-16}+\frac{1}{x^2-4}-\frac{1}{x^2+4}$$

$(x^2-4)(x^2+4)$ $\quad -12+4-(-4)=-12+4+4=-4$

$$=\frac{x^2-12+x^2+4-(x^2-4)}{(x^2-4)(x^2+4)}$$

$$=\frac{x^2-4\cdot 1}{(x^2-4)(x^2+4)}$$

$(x-2)(x+2)$

$$=\frac{1}{x^2+4},\ x\neq\pm 2$$

6.3 Complex Fractions

6. $$\frac{\left(1+\frac{1}{x}\right)}{\left(1-\frac{1}{x^2}\right)}=\frac{\frac{x}{x}\cdot\frac{1}{1}+\frac{1}{x}}{\frac{x^2}{x^2}\cdot\frac{1}{1}-\frac{1}{x^2}}=\frac{\left(\frac{x+1}{x}\right)}{\left(\frac{x^2-1}{x^2}\right)}$$

$$=\frac{x+1}{x}\cdot\frac{x^2}{x^2-1}=\frac{(x+1)\cdot x^{2-1}}{x^1\cdot(x-1)(x+1)}$$

$$=\frac{x}{x-1},\ x\neq 1,0,-1$$

16. $\dfrac{\frac{x}{x+1}-\frac{1}{x}}{\frac{x}{x+1}+\frac{1}{x}} = \dfrac{\frac{x}{(x+1)}\cdot\frac{x}{x}-\frac{1}{x}\cdot\frac{x+1}{(x+1)}}{\left(\frac{x}{x+1}\cdot\frac{x}{x}+\frac{1}{x}\cdot\frac{x+1}{x+1}\right)}$

$= \dfrac{\left(\frac{x^2-1(x+1)}{x(x+1)}\right)}{\left(\frac{x^2+1(x+1)}{x(x+1)}\right)} = \dfrac{x^2-x-1}{\cancel{x(x+1)}}\cdot\dfrac{\cancel{x(x+1)}}{x^2+x+1}$

$= \dfrac{x^2-x-1}{x^2+x+1}, \; x\neq -1, 0$

6.4 Rational Equations

14. $\dfrac{5}{x}=\dfrac{2}{x+3}$ $\quad 5(x+3)=2x$

LCD is $x(x+3)$

Multiply both sides by $\frac{LCD}{1}$

$\dfrac{\cancel{x(x+3)}}{1}\cdot\dfrac{5}{\cancel{x}} = \dfrac{2}{\cancel{x+3}}\cdot\dfrac{x\cancel{(x+3)}}{1}$

$(x+3)\cdot 5 = 2x$

$5x+15=2x$

$5x-2x=-15$

$3x=-15$

$x=-5$

32. $\text{LCD}\cdot\left(\frac{9}{x^2+7x+10}\right)=\left(\frac{5}{x+2}-\frac{3}{x+5}\right)\cdot\text{LCD}$

$(x+2)(x+5)$

$\frac{(x+2)(x+5)}{1}\cdot\frac{9}{(x+2)(x+5)}=\frac{5}{x+2}\cdot\frac{(x+2)(x+5)}{1}-\frac{3}{x+5}\cdot\frac{(x+2)(x+5)}{1}$

$9=5(x+5)-3(x+2)$

$9=5x+25-3x-6$

$-10=2x$

$-5=x$

no solution ∴

40. $1-\frac{1}{\left(1-\frac{1}{x-2}\right)}=1-\frac{1}{1\cdot\frac{x-2}{x-2}-\frac{1}{x-2}}$

$=1-\frac{1}{\left(\frac{x-3}{x-2}\right)}=1-1\cdot\frac{x-2}{x-3}=$

$=1\cdot\frac{x-3}{x-3}-\frac{x-2}{x-3}=\frac{x-3-(x-2)}{x-3}=\frac{-1}{x-3}$

$x\neq 2,3$

Simplifying Rational Expressions:

- Factor irst
- Find least common denominator in order to add/subtract [multiply by 1, i.e. (x-1)/(x-1), etc.]
- Dividing by a fraction is the same as multiplying by its reciprocal
- List values excluded from the domain

Solving Rational Equations:

- Determine least common denominator, and multiply both sides by LCD/ 1 in order to eliminate all fractions
- Remember to check solutions to see if they make the original problem undeined!

Textbook Problems:

6.1 #39-79 odd

6.2 #3-95 odd

6.3 #17, 23, 25, 33, 41, 43

6.4 #19, 25, 29, 31

Test #4:
(Originally scheduled for Friday, 18 Oct)
Rescheduled for **Monday, 21 Oct**

Khan Academy:

- Dividing polynomials by binomials 1
- Simplifying rational expressions 1
- Dividing polynomials by binomials 2
- Simplifying rational expressions 2
- Dividing polynomials by binomials 3
- Simplifying rational expressions 3
- Adding and subtracting rational expressions 0.5
- Adding and subtracting rational expressions 1
- Adding and subtracting rational expressions 1.5
- Adding and subtracting rational expressions 2
- Multiplying and dividing rational expressions 1
- Multiplying and dividing rational expressions 2
- **Extraneous solutions**

22. $$\frac{1-\frac{3}{x}-\frac{10}{x^2}}{1+\frac{11}{x}+\frac{18}{x^2}}$$

34. $$\frac{\frac{y}{y+2}-\frac{y}{y-2}}{\frac{y}{y+2}+\frac{y}{y-2}}$$

44. $a - \dfrac{1}{2 - \dfrac{2}{2 - \frac{2}{a}}}$