29 $\frac{1}{x-5} - \frac{19-2x}{(x-5)(x+4)}$ LCD $= (x-5)(x+4)$

$= \frac{1}{x-5} \cdot \frac{(x+4)}{x+4} - \frac{19-2x}{(x-5)(x+4)} = \frac{(x+4) - (19-2x)}{(x-5)(x+4)}$

$= \frac{x+4-19+2x}{(x-5)(x+4)} = \frac{3x-15}{(x-5)(x+4)} = \frac{3(x-5)}{(x-5)(x+4)} = \boxed{\frac{3}{x+4}}$

Oct 22-11:04 AM

§ 6.3 Due @ end of class, Monday.

Complex Fractions

Invert & Multiply

$$\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{a}{b} \cdot \frac{d}{c}$$

$$\frac{\frac{2}{3}}{\frac{4}{5}} = \frac{2}{3} \cdot \frac{5}{4} = \frac{\cancel{2}^{1}}{3} \cdot \frac{5}{\cancel{2}_{1} \cdot 2} = \frac{5}{6}$$

$$\frac{\frac{15}{2x}}{\frac{5}{6x}} = \frac{\cancel{15}^{3}}{\cancel{2x}_{1}} \cdot \frac{\cancel{6x}^{3}}{\cancel{5}_{1}} = 9$$

$\frac{1}{2}x$ BAD

$\frac{1}{2}x$ GOOD

$1/2\,x$ BAD

$(1/2)\,x$ GOOD

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

GOOD

Oct 22-11:10 AM

The next level

$$\frac{\frac{x^2-4y^2}{xy}}{\frac{1}{y}-\frac{1}{x}} = \frac{\frac{x^2-4y^2}{xy}}{\frac{x-y}{xy}} = \frac{x^2-4y^2}{xy}\cdot\frac{xy}{x-y}$$

Combine into one frac. Do what we did before.

$$= \frac{(x^2-4y^2)(xy)}{(xy)(x-y)}$$

$$= \frac{x^2-4y^2}{x-y}$$

$\frac{1}{y}\cdot\frac{x}{x} - \frac{1}{x}\cdot\frac{y}{y}$

LCD = xy

$= \frac{x-y}{xy}$

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$$\frac{\frac{x^2-4y^2}{xy}}{\frac{1}{y}-\frac{1}{x}}$$

LCD = xy

LCD = xy

} LCD = xy

$$\frac{\frac{x^2-4y^2}{xy}\cdot\frac{xy}{1}}{\frac{1}{y}\cdot\frac{xy}{1}-\frac{1}{x}\cdot\frac{xy}{1}} = \frac{x^2-4y^2}{x-y}$$

$(x-2y)(x+2y)$ leads nowhere in terms of cancellation

Oct 22-11:25 AM

$$\frac{\frac{3}{x-4}-\frac{2}{x-4}}{\frac{2}{x-4}-\frac{2}{x}}$$

LCD = $x(x-4)$

Lindsey

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

$$=\frac{x}{2x-2x+8}=\frac{x}{8}$$

$$\frac{\frac{3}{x-4}-\frac{2}{x-4}}{\frac{2}{x-4}-\frac{2}{x}} = \frac{\frac{1}{x-4}}{\frac{2}{x-4}\cdot\frac{x}{x}-\frac{2}{x}\cdot\frac{x-4}{x-4}}$$

$$= \frac{\frac{1}{x-4}}{\frac{2x-2(x-4)}{x(x-4)}} = \frac{\frac{1}{x-4}}{\frac{8}{x(x-4)}} =$$

$$\frac{1}{x-4}\cdot\frac{x(x-4)}{8} = \frac{x}{8}$$

Oct 22-11:36 AM

$$\frac{2^{-1}-4}{4+2^{-2}} = \frac{\frac{1}{2}-4}{4+\frac{1}{2^2}}$$

Method 1

LCD $= 2^2$

$$\frac{\frac{1}{2}\cdot\frac{2^2}{1}-4\cdot 2^2}{4\cdot 2^2+\frac{1}{2^2}\cdot\frac{2^2}{1}}$$

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

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

Method 2

$$\frac{\frac{1}{2}-\frac{4\cdot 2}{2}}{\frac{4\cdot 2^2}{2^2}+\frac{1}{2^2}}$$

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

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

$$\frac{2-4\cdot 2^2}{4\cdot 2^2+1}$$

$$\frac{5}{7} = \frac{\cancel{2}+3}{\cancel{2}+5} = \frac{3}{5}$$

!? No!

Oct 22-11:38 AM

$$\text{Quotient} = \frac{\text{numerator}}{\text{denominator}} = \frac{\text{Dividend}}{\text{Divisor}}$$

§6.4 Division of Polynomials.

we've already sorta done this.

Factor out the GCF

$$6x^5 - 8x^4 + 2x^3$$

$$= 2x^3\left(\frac{6x^5}{2x^3} - \frac{8x^4}{2x^3} + \frac{2x^3}{2x^3}\right)$$

$$= 2x^3(3x^2 - 4x + 1)$$

Division by the monomial $2x^3$ is term-by-term.

Oct 22-11:42 AM

$\frac{296}{7}$

$7\overline{)296}$ 42 r 2

$-(28)$

16

$-(14)$

2

This says

$\frac{296}{7} = 42 + \frac{2}{7}$

$= \text{Quotient} + \frac{\text{Remainder}}{\text{Divisor}}$

OR

$296 = (7)(42) + 2$

$\text{Dividend} = \text{Divisor} \cdot \text{Quotient} + \text{Remainder}$

$\frac{x^3 - 7x^2 + 2x + 5}{x - 3} = ?$

$x - 3 \overline{)x^3 - 7x^2 + 2x + 5}$ $x^2 - 4x - 10$ r -25

Subtract $\rightarrow$ $-x^3 + 3x^2$

$-4x^2 + 2x + 5$

$+4x^2 \mp 12x$

$-10x + 5$

$+10x \mp 30$

-25

$\frac{x^3}{x} = x^2$

$x^2(x-3) = x^3 - 3x^2$

$\frac{-4x^2}{x} = -4x$

$-4x(x-3) = -4x^2 + 12x$

$\frac{-10x}{x} = -10$

$\frac{x^3 - 7x^2 + 2x + 5}{x - 3} = x^2 - 4x - 10 - \frac{25}{x-3}$

$x^3 - 7x^2 + 2x + 5 = (x-3)(x^2 - 4x - 10) - 25$