

Use formulas to expand:

1. (4pts) $(x-9)^2 = x^2 - 2 \cdot x \cdot 9 + 9^2$
 $= x^2 - 18x + 81$

2. (5pts) $(4u+5v)^2 = (4u)^2 + 2 \cdot 4u \cdot 5v + (5v)^2$
 $= 16u^2 + 40uv + 25v^2$

3. (4pts) $(3x+y^2)(3x-y^2) = (3x)^2 - (y^2)^2 = 9x^2 - y^4$

Use the *ac*-method or another method to factor. Show how you got your answer.

4. (5pts) $2x^2 - 13x - 7 = 2x^2 - 14x + x - 7 = 2x(x-7) + (x-7)$
 $= (2x+1)(x-7)$
 $a = -14$
 $prod = -14$ $-14, 1$
 $sum = -13$

5. (6pts) $6x^2 - 31x + 18 = 6x^2 - 27x - 4x + 18 = 3x(2x-9) - 2(2x-9)$
 $= (3x-2)(2x-9)$
 $a = 108$
 $prod = 108$ | $36, 3$ | $-27, -4$
 $sum = 31$ | 39 | -31

6. (8pts) Compute expressions with fractions by hand.

$\frac{2}{5} \cdot \frac{15}{8} = \frac{3}{4}$
 $\frac{2 \cdot 15}{5 \cdot 8} = \frac{30}{40} = \frac{3}{4}$

$\frac{12}{7} \div \frac{18}{49} = \frac{12}{7} \cdot \frac{49}{18} = \frac{14}{3}$
 $\frac{12 \cdot 49}{7 \cdot 18} = \frac{14 \cdot 7}{3 \cdot 3} = \frac{14}{3}$

$\frac{3}{10} - \frac{8}{15} = \frac{3 \cdot 3 - 8 \cdot 2}{30} = -\frac{7}{30}$
 $LCD = 30$

$\frac{13}{18} + \frac{7}{30} = \frac{13 \cdot 5 + 7 \cdot 3}{90} = \frac{86}{90} = \frac{43}{45}$
 $LCD = 90$

$$ac = -40 \quad -8, 5 \quad 2x^2 - 3x - 20 = 2x^2 - 8x + 5x - 20$$

$$\text{sum} \rightarrow \quad = 2x(x-4) + 5(x-4)$$

$$= (2x+5)(x-4)$$

Multiply or divide the rational expressions.

$$7. \text{ (7pts)} \quad \frac{6x+12}{x^2-16} \cdot \frac{2x^2-3x-20}{2x+4} = \frac{3 \cancel{(x+4)}}{(x-4)\cancel{(x+4)}} \cdot \frac{(2x+5)\cancel{(x-4)}}{\cancel{(x+4)}}$$

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

$$8. \text{ (7pts)} \quad \frac{x^2-3x}{x^2} \div \frac{x^2-9}{2x^2+7x+3} = \frac{x^2-3x}{x^2} \cdot \frac{2x^2+7x+3}{x^2-9}$$

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

$$ac = 6 \quad 1, 6$$

$$\text{sum} = 7$$

$$2x^2 + 6x + x + 3$$

$$= 2x(x+3) + 1(x+3)$$

$$= (2x+1)(x+3)$$

Add or subtract the rational expressions.

$$9. \text{ (6pts)} \quad \frac{5x-2}{x^2+4x} - \frac{7}{x} = \frac{5x-2}{x(x+4)} - \frac{7}{x} = \frac{5x-2-7(x+4)}{x(x+4)}$$

$$= \frac{5x-2-7x-28}{x(x+4)} = \frac{-2x-30}{x(x+4)}$$

$$10. \text{ (8pts)} \quad \frac{2x-1}{3x^2-13x-10} + \frac{x}{x^2-25} = \frac{2x-1}{(3x+2)(x-5)} + \frac{x}{(x-5)(x+5)}$$

$$ac = -30 \quad -15, 2$$

$$\text{sum} = -13$$

$$3x^2 - 15x + 2x - 10$$

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

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

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

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

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

$$\leftarrow \begin{array}{l} ac = -25 \quad -5, 5 \quad -25, 1 \\ \text{sum} = 11 \quad 0 \quad -24 \\ \text{does not factor} \end{array}$$