

Use formulas to expand:

$$1. (4pts) (3x - y)^2 = (3x)^2 - 2 \cdot (3x) \cdot y + y^2 \\ = 9x^2 - 6xy + y^2$$

$$2. (5pts) (u^2 + 4y)^2 = (u^2)^2 + 2 \cdot u^2 \cdot 4y + (4y)^2 \\ = u^4 + 8u^2y + 16y^2$$

$$3. (4pts) (5x - 2y)(5x + 2y) = (5x)^2 - (2y)^2 \\ = 25x^2 - 4y^2$$

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

$$4. (5pts) 3x^2 - 13x - 10 = 3x^2 - 15x + 2x - 10 \\ ac = -30 \quad \approx 3x(x-5) + 2(x-5) \\ \text{prod} = -30 \quad -15, 2 \\ \text{sum} = -13 \quad = (3x+2)(x-5)$$

$$5. (6pts) 12x^2 + 8x - 15 = 12x^2 + 18x - 10x - 15 \\ ac = -180 \quad = 6x(2x+3) - 5(2x+3) \\ \text{prod} = -180 \quad -18, -10 \\ \text{sum} = 8 \quad = (6x-5)(2x+3)$$

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

$$\frac{4}{7} \cdot \frac{35}{16} = \frac{5}{4}$$

$$\frac{2}{3} \div \frac{14}{9} = \frac{2}{3} \cdot \frac{9}{14} = \frac{3}{7}$$

$$\frac{7}{5} \div \frac{4}{15} = \frac{21}{5} \cdot \frac{15}{4} = \frac{25}{3}$$

$$\frac{9}{14} - \frac{11}{35} = \frac{9 \cdot 5}{2 \cdot 7 \cdot 5} - \frac{11 \cdot 2}{5 \cdot 7 \cdot 2} = \frac{45 - 22}{70} = \frac{23}{70}$$

$$14 = 2 \cdot 7 \quad \text{LCD} = 2 \cdot 7 \cdot 5 \\ 35 = 5 \cdot 7$$

Multiply or divide the rational expressions.

$$7. (7\text{pts}) \frac{x+1}{x^2-16} \cdot \frac{3x-12}{2x^2+8x+6} = \frac{\cancel{x+1}}{\cancel{(x-4)}(x+4)} \cdot \frac{3\cancel{(x-4)}}{2\cancel{(x+1)}(x+3)} = \frac{3}{2(x+4)(x+3)}$$

prod

$$8. (7\text{pts}) \frac{4x+2}{3x+9} \div \frac{2x^2-x-1}{x^2+2x-3} = \frac{4x+2}{3x+9} \cdot \frac{x^2+2x-3}{2x^2-x-1} = \frac{2\cancel{(2x+1)}}{3\cancel{(x+3)}} \cdot \frac{\cancel{(x+3)}\cancel{(x-1)}}{\cancel{(2x+1)}\cancel{(x-1)}}$$

prod = -2, -1
sum = -1

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

$$2x^2 - 2x + x - 1$$

$$2x(x-1) + x-1$$

$$(2x+1)(x-1)$$

Add or subtract the rational expressions.

$$9. (6\text{pts}) \frac{x-1}{x-3} - \frac{8x-2}{x^2+5x-24} = \frac{x-1}{x-3} - \frac{8x-2}{(x+8)(x-3)} = \frac{(x-1)(x+8) - (8x-2)}{(x+8)(x-3)}$$

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

$$= \frac{\cancel{(x-3)}(x+2)}{(x+8)\cancel{(x-3)}} = \frac{x+2}{x+8}$$

$$10. (8\text{pts}) \frac{x+2}{4x^2+3x-7} + \frac{x-5}{x^2-10x+9} = \frac{(x+2)(x-9) + (x-5)(4x+7)}{(x-1)(4x+7)(x-9)}$$

prod = -28, 7, -9
sum = 3

$$4x^2 + 7x - 4x - 7$$

$$x(4x+7) - (4x+7)$$

$$(x-1)(4x+7)$$

$$= \frac{x^2 - 9x + 2x - 18 + 4x^2 - 20x + 7x - 35}{(x-1)(4x+7)(x-9)}$$

$$= \frac{5x^2 - 20x - 53}{(x-1)(4x+7)(x-9)} \leftarrow \text{doesn't factor}$$

prod = -265
sum = -20

253, -1	53, 5
252	48
no	no