

Show all your work!

Use formulas to expand:

1. (4pts) $(4u - 3v^2)(4u + 3v^2) = (4u)^2 - (3v^2)^2$
 $= 16u^2 - 9v^4$

2. (4pts) $(x - 5y)^2 = x^2 - 2 \cdot x \cdot 5y + (5y)^2$
 $= x^2 - 10xy + 25y^2$

3. (5pts) $(a^2 + 2b^2)^2 = (a^2)^2 + 2a^2 \cdot 2b^2 + (2b^2)^2$
 $= a^4 + 4a^2b^2 + 4b^4$

4. (8pts) Compute expressions with fractions by hand.

$$\frac{3 \cdot 6 \cdot 21}{35 \cdot 8} = \frac{9}{20}$$

$$\frac{3}{14} \div \frac{27}{8} = \frac{1}{7} \cdot \frac{8}{9} = \frac{8}{63}$$

$$\frac{3}{4} + \frac{7}{12} = \frac{3}{12} + \frac{7}{12} = \frac{10}{12} = \frac{5}{6}$$

$$\frac{4 \cdot 5}{4 \cdot 18} - \frac{11 \cdot 3}{24 \cdot 3} = \frac{20}{72} - \frac{33}{72} = -\frac{13}{72}$$

$$LCD = 72 = 4 \cdot 18$$

$$= 3 \cdot 24$$

Multiply or divide the rational expressions.

5. (7pts) $\frac{x^2 - 9x + 14}{10x - 70} \cdot \frac{2x + 6}{x^2 + 3x - 10} = \frac{(x-2)(x-7)}{5 \cdot 10(x-7)} \cdot \frac{2(x+3)}{(x-2)(x+5)}$
 $= \frac{x+3}{5(x+5)}$

$$6. (7\text{pts}) \frac{2(x^2-16)}{2x^2-3x-20} \div \frac{x+4}{6x+15} = \frac{2(x-4)(x+4)}{(2x+5)(x-4)} \cdot \frac{3(2x+5)}{x+4} = \frac{6}{1} = 6$$

prod = -40
sum = -3
-8, 5
 $2x^2 - 8x + 5x - 20 = 2x(x-4) + 5(x-4) = (2x+5)(x-4)$

Add or subtract the rational expressions.

$$7. (6\text{pts}) \frac{2x^2+11x-6}{x^2-x-20} - \frac{2x+1}{x-5} = \frac{2x^2+11x-6}{(x-5)(x+4)} - \frac{(2x+1)(x+4)}{(x-5)(x+4)}$$

$$= \frac{2x^2+11x-6 - (2x^2+8x+x+4)}{(x-5)(x+4)} = \frac{2x-10}{(x-5)(x+4)} = \frac{2(x-5)}{(x-5)(x+4)} = \frac{2}{x+4}$$

$$8. (8\text{pts}) \frac{14}{3x^2-4x-15} - \frac{9}{x^2+3x-18} = \frac{14(x+6)}{(3x+5)(x-3)(x+6)} - \frac{9(3x+5)}{(x+6)(x-3)(3x+5)}$$

$$= \frac{14x+84 - (27x+45)}{(3x+5)(x-3)(x+6)} = \frac{-13x+39}{(3x+5)(x-3)(x+6)} = \frac{-13(x-3)}{(3x+5)(x-3)(x+6)}$$

$$= -\frac{13}{(3x+5)(x+6)}$$

prod = -45
sum = -4
-9, 5
 $3x^2 - 9x + 5x - 15 = 3x(x-3) + 5(x-3) = (3x+5)(x-3)$

Simplify the following expressions, assuming all variables are positive.

$$9. (3\text{pts}) \sqrt{50x^7y^3} = \sqrt{2 \cdot 25 \cdot x^2 \cdot x^2 \cdot x^1 \cdot x^1 \cdot y^2 \cdot y} = 5 \cdot x \cdot x \cdot y \sqrt{2xy} = 5x^2y \sqrt{2xy}$$

$$10. (4\text{pts}) \sqrt[3]{18u^4v^7} \sqrt[3]{3u^2v^3} = \sqrt[3]{54u^6v^{10}} = \sqrt[3]{2 \cdot 27 \cdot u^2 \cdot u^2 \cdot u^2 \cdot v^3 \cdot v^3 \cdot v^4}$$

$$= 3 \cdot u \cdot u \cdot v \cdot v \cdot v \sqrt[3]{2v} = 3u^2v^3 \sqrt[3]{2v}$$

$$11. (4\text{pts}) (2+3\sqrt{3})(5-\sqrt{12}) = (2+3\sqrt{3})(5-2\sqrt{3})$$

$$= 10 - 4\sqrt{3} + 15\sqrt{3} - 6\sqrt{3}^2$$

$$= 10 + 11\sqrt{3} - 6 \cdot 3 = -8 + 11\sqrt{3}$$