College Algebra — Joysheet 7
MAT 140, Spring 2026 — D. Ivanšić

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Covers: JIT 13, 21, 22, 23, 25 *Show all your work!*

Use formulas to expand:

1. (4pts) $(3a+2b)^2 =$ $(3a)^2+2\cdot 3a\cdot 2b+(2b)^2$

$= 9a^2+12ab+4b^2$

2. (5pts) $(u^2-7v^3)^2 =$ $(u^2)^2-2u^2\cdot 7v^3+(7v^3)^2$

$= u^4-14u^2v^3+49v^6$

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

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

$\frac{4}{15}\cdot\frac{35}{6} = \frac{14}{9}$ (2, 7, 3, 3)

$\frac{14}{27}\div\frac{49}{18} = \frac{14}{27}\cdot\frac{18}{49} = \frac{4}{21}$ (2, 2, 3, 7)

$\frac{7}{6}+\frac{11}{18} = \frac{21}{18}+\frac{11}{18} = \frac{32}{18} = \frac{16}{9}$ (3, 3)

$\frac{15}{28}-\frac{20}{35} = \frac{75-80}{140} = \frac{-5}{140} = -\frac{1}{28}$ (5, 5, 4)

$2\cdot 2\cdot 7 \quad 5\cdot 7$

LCD is $2\cdot 2\cdot 5\cdot 7 = 140$

Multiply or divide the rational expressions.

5. (7pts) $\frac{x-4}{3x+21}\cdot\frac{6x^2+42x}{x^2+x-20} = \frac{x-4}{3(x+7)}\cdot\frac{6x(x+7)}{(x+5)(x-4)} = \frac{2x}{x+5}$ (2, 3, 1)

6. (7pts) $\dfrac{3x-5}{3x^2+14x-5} \div \dfrac{3x+1}{9x^2-1} =$

$(3x)^2 - 1^2$

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

prod $= -15$ $\quad -15, -1$

sum $= 14$

$3x^2 + 15x - x - 5$

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

$= (3x-1)(x+5)$

Add or subtract the rational expressions.

7. (6pts) $\dfrac{x+3}{x+7} - \dfrac{x^2-7}{x^2+5x-14} =$ $\quad \cdot(x-2)$ $\quad \cdot(x+7)$ $\quad (x+7)(x-2)$

$= \dfrac{(x+3)(x-2) - (x^2-7)}{(x+7)(x-2)} = \dfrac{x^2+x-6-x^2+7}{(x+7)(x-2)}$

$= \dfrac{x+1}{(x+7)(x-2)}$

8. (8pts) $\dfrac{-2x+8}{2x^2-13x+21} + \dfrac{x+15}{x^2+3x-18} =$ $\quad (x+6)$ $\quad (2x-7)$

$(x+6)(2x-7)(x-3)$ $\quad (x+6)(x-3)(2x-7)$

$= \dfrac{(x+6)(-2x+8) + (x+15)(2x-7)}{(x+6)(2x-7)(x-3)}$

prod $= 42$ $\quad -6, -7$

sum $= -13$

$2x^2 - 6x - 7x + 21$

$= 2x(x-3) - 7(x-3)$

$= (2x-7)(x-3)$

$= \dfrac{-2x^2 - 4x + 48 + 2x^2 + 23x - 105}{(x+6)(2x-7)(x-3)} = \dfrac{19x-57}{(x+6)(2x-7)(x-3)}$

$19(x-3)$

$= \dfrac{19}{(x+6)(2x-7)}$

Simplify the following expressions, assuming all variables are positive.

9. (3pts) $\sqrt[3]{32u^6v^4} = \sqrt[3]{8 \cdot 4 \cdot u^3 u^3 \cdot v^3 v} = \sqrt[3]{8}\sqrt[3]{u^3}\sqrt[3]{u^3}\sqrt[3]{v^3}\sqrt[3]{4v} = 2u^2v\sqrt[3]{4v}$

$2 \quad u \quad u \quad v$

10. (4pts) $\sqrt{6x^3y^4}\sqrt{30xy} =$ $\quad 6 \quad x \quad x \quad y \quad y$

$= \sqrt{180x^4y^5} = \sqrt{36 \cdot 5 \cdot x^2 x^2 \cdot y^2 y^2 y} = 6x^2y^2\sqrt{5y}$

11. (4pts) $(1+3\sqrt{5})(3\sqrt{20}-4) =$ $\quad 4 \cdot 5$

$(1+3\sqrt{5})(6\sqrt{5}-4) = 6\sqrt{5} + 18\sqrt{5^2} - 4 - 12\sqrt{5} = 90 - 4 - 6\sqrt{5}$

$= 86 - 6\sqrt{5}$