College Algebra w.B.A. — Joysheet 2
MAT 120, Spring 2014 — D. Ivanšić

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Show all your work!

Simplify and write the answer so all exponents are positive:

1. (4pts) $(4x^2y^{-2})^3(2x^{-3}y^2)^4 = 4^3(x^2)^3(y^{-2})^3 2^4(x^{-3})^4(y^2)^4 = 64x^6y^{-6}\cdot 16x^{-12}y^8$

$= 1024\,x^{-6}y^2 = \dfrac{1024y^2}{x^6}$

2. (5pts) $\dfrac{(6u^3v^{-4})^2}{(3u^2z^{-3})^4} = \dfrac{6^2(u^3)^2(v^{-4})^2}{3^4(u^2)^4(z^{-3})^4} = \dfrac{36u^6v^{-8}}{81u^8z^{-12}} = \dfrac{4u^{-2}v^{-8}}{9z^{-12}} = \dfrac{4z^{12}}{9u^2v^8}$

Simplify, showing intermediate steps.

3. (2pts) $\sqrt{96} = \sqrt{16\cdot 6} = 4\sqrt{6}$

4. (3pts) $\sqrt[3]{16} - \sqrt[3]{54} = \sqrt[3]{8\cdot 2} - \sqrt[3]{27\cdot 2}$

$= 2\sqrt[3]{2} - 3\sqrt[3]{2} = -\sqrt[3]{2}$

Solve the equations.

5. (3pts) $7 - 3(2+x) = 5(x+3) - 2$

$7 - 6 - 3x = 5x + 15 - 2$

$1 - 3x = 5x + 13 \quad | +3x - 13$

$-12 = 8x$

$x = -\dfrac{12}{8} = -\dfrac{3}{2}$

6. (5pts) $|2x-1| = |5x+4|$

$2x-1 = 5x+4$ or $2x-1 = -(5x+4)$

$-5 = 3x$ $\qquad 2x-1 = -5x-4$

$x = -\dfrac{5}{3}$ or $\qquad 7x = -3$

$x = -\dfrac{3}{7}$

7. (6pts) $\dfrac{3}{x+1} + \dfrac{9}{x^2-x-2} = \dfrac{4}{x-2} \quad \Big| (x-2)(x+1)$

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

$\dfrac{3}{x+1}(x-2)(x+1) + \dfrac{9}{(x-2)(x+1)}(x-2)(x+1) = \dfrac{4}{x-2}(x-2)(x+1)$

$3(x-2) + 9 = 4(x+1)$

$3x + 3 = 4x + 4 \quad | -3x - 4$

$-1 = x$

gives 0 in denominator in original equation, so no solution

8. (5pts) $xy + yz + zx = 4$ (solve for z)

$yz + xz = 4 - xy$

$(y+x)z = 4 - xy \quad | \div (x+y)$

$z = \dfrac{4-xy}{x+y}$

Simplify.

9. (8pts) $\dfrac{x-3}{x^2-4x-5} - \dfrac{2x+3}{x^2-25}$

$(x-5)(x+1) \quad (x-5)(x+5)$

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

prod=18	±18, 1	9, 2	6, 3
sum=3	no	no	no

doesn't factor ?

$= \dfrac{x^2+2x-15-(2x^2+5x+3)}{(x-5)(x+1)(x+5)} = \dfrac{-x^2-3x-18}{(x-5)(x+1)(x+5)} = -\dfrac{x^2+3x+18}{(x-5)(x+1)(x+5)}$

10. (7pts) $\dfrac{1-\dfrac{2}{x+3}}{1+\dfrac{2}{x-3}} = \dfrac{1-\frac{2}{x+3}}{1+\frac{2}{x-3}} \cdot \dfrac{(x+3)(x-3)}{(x+3)(x-3)} = \dfrac{(x-3)(x+3)-2(x-3)}{(x+3)(x-3)+2(x+3)}$

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

11. (7pts) Simplify and write the answer so all exponents are positive:

$$\frac{\left(8x^3y^{\frac{5}{2}}\right)^{\frac{4}{3}}}{\left(100x^4y^{-\frac{4}{3}}\right)^{\frac{1}{2}}} = \frac{(8^{\frac{1}{3}})^4 (x^3)^{\frac{4}{3}} (y^{\frac{5}{2}})^{\frac{4}{3}}}{100^{\frac{1}{2}} (x^4)^{\frac{1}{2}} (y^{-\frac{4}{3}})^{\frac{1}{2}}} = \frac{2^4 x^4 y^{\frac{10}{2}}}{10\, x^2\, y^{-\frac{2}{3}}} = \frac{\cancel{16}^{8}\, x^2 y^{\frac{10}{3}+\frac{2}{3}}}{\cancel{10}_{5}} = \frac{8x^2y^4}{5}$$

12. (5pts) Rationalize the denominator.

$$\frac{\sqrt{3}+\sqrt{5}}{\sqrt{5}-2\sqrt{3}} \cdot \frac{\sqrt{5}+2\sqrt{3}}{\sqrt{5}+2\sqrt{3}} = \frac{\sqrt{15}+2\sqrt{3}^2+\sqrt{5}^2+2\sqrt{15}}{\sqrt{5}^2-(2\sqrt{3})^2} = \frac{3\sqrt{15}+6+5}{5-12} = -\frac{11+3\sqrt{15}}{7}$$

$5-12 = -7$