Spring 07 Algebra Evaluation

1. Perform each of the following products. Express your answers in simplest form. Show your work in detail!

   (1) $\dfrac{x-2}{x^2-5x+6} \cdot \dfrac{x^2-9}{x^2+3x}$

   (2) $\dfrac{12x^3+2x^2-2x}{x^2+x-6} \cdot \dfrac{x^2-x-2}{2x^2+9x+4}$

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

   (4) $\dfrac{x-1}{x+4} \cdot \dfrac{x^2-16}{x^2-2x-8} \div \dfrac{x-1}{2x+1}$

   (5) $\dfrac{1}{x^3-4x} - \dfrac{x-4}{x^2+6x+8}$

   (6) $\dfrac{2(x-6)}{(x-2)(x-3)} - \dfrac{2-3x}{x^2-4}$

2. Simplify each of the following radicals. No radicals are allowed in a denominator. Assume that each variable is nonnegative.

   (1) $\sqrt[4]{12a^5b^9} \cdot \sqrt[4]{24ab^7}$

   (2) $\sqrt[3]{-4x^4} \cdot \sqrt[3]{2x^2y^7} \cdot \sqrt[3]{-16x^5y^4}$

   (3) $\sqrt[3]{\dfrac{27x^5y^{12}}{4x^2y^{14}}}$

3. Perform the indicated operations and simplify your results.

   (1) $\sqrt{125} - 2\sqrt{75} + 3\sqrt{5}$

   (2) $(4\sqrt{x}+3\sqrt{y})(\sqrt{x}-2\sqrt{y})$

4. Rationalize the denominators and simplify your answers.

   (1) $\dfrac{2+\sqrt{3}}{1+\sqrt{5}}$

   (2) $\dfrac{\sqrt{x}-2\sqrt{y}}{\sqrt{x}+3\sqrt{y}}$

5. Rationalize the numerators and simplify your answers.

(1) $\dfrac{\sqrt{x} + \sqrt{5}}{5 - x}$

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

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6. Solve each of the following equations, verify your answers on back of the sheet, if necessary , and finally box your answers.

(1) $\sqrt[3]{x + 6} = -2$

(2) $\sqrt{2x^2 + 1} = \sqrt{3x + 3}$

(3) $\sqrt{4x - 3} - \sqrt{2x + 5} = 0$

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

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7. Convert each radical to a rational exponent and simplify if possible.

(1) $\sqrt[3]{x^3 y^{-4}}$

(2) $\dfrac{1}{\sqrt{2x^2}}$

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8. Simplify each of the following expressions, and write your final answers in rational exponent form without negative exponents.

(1) $\dfrac{(x^{2/3})^2}{x^{-3}}$

(2) $\dfrac{x^{2/3} y^{-2}}{2x^{-1/2}}$

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9. Solve each of the following equations. Check your answers.

(1) $(x + 6)^{1/2} = -x$

(2) $(2x - 1)^{2/3} = 9$

10. Use the substitution to solve each of the following equations. Indicate your substitution for each problem.

    (1) $2x^{2/3} - 3x^{1/3} = 2$

    (2) $(x - 2) - (x - 2)^{1/2} - 6 = 0$

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11. Write $\dfrac{8 - \sqrt{-128}}{4}$ in standard form $a + bi$.

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12. Computer the power of i.

    (1) i^{245}

    (2) i^{1203}

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13. Computer each of the following and write your final answers in standard form $a + bi$.

    (1) $(3 + 2i) + (4 + 5i) - 2(3 - 4i)$

    (2) $(45 - 2i)^2 - 2i(-1 - 2i)$

    (3) $(2 + 4i)(4 - 2i) - (2 - 3i)^2$

    (4) $(7 + 2i)(7 - 2i) - (3 - 4i)^2$

    (5) $(4 - 3i)^3$

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14. Find the value of $(1 - i)^{11}$. Show your work.