

Algebra 2 Final Exam Review Sheet #4: Simplifying and Evaluating Expressions

1. Simplify the following. Answers should be written without exponents when possible.

a. $16^{3/2}$

b. $4^{-3/2}$

c. $\left(\frac{8}{27}\right)^{-2/3}$

2. Simplify the following. All like terms should be combined. Your answers should have no negative exponents and no radical signs.

a. $\frac{2x^2 \cdot 3x^{-1}}{12x^{-3}}$

b. $(\sqrt[3]{2x^3})$

c. $3(x+4)^{-2}$

d. $\left(\frac{-2x^3}{3}\right)^2$

e. $(x+2y)^2 - [x^2 + (2y)^2]$

f. $(2x^3y^2)^{-2} \cdot (4xy^2)^2$

g. $3\sqrt{2x} \cdot 4\sqrt{8x}$

h. $3x^{-2}(5x^2 + 6x)$

3. Factor the following completely:

a. $3x^3 - 12x$

b. $-3x^2 + 6x - 3$

c. $-x^3 + 4x^2 + 21x$

d. $2x^2 - 9x - 5$

e. $2x^3 - 6x^2 - 8x + 24$

f. $x^4 + 3x^2 - 4$

4. Simplify the following complex numbers: write in the form $a + bi$ (remember, when dividing complex numbers, multiply numerator and denominator by the denominator's conjugate).

a. $(3 - 2i) - 2(5 - 3i)$

b. $2(3 - 2i) + i(-2 + 4i)$

c. $(2 - i)(4 + 3i)$

d. $(2 - 3i)^2 - (5 - 2i)$

5. Perform the divisions below. Use long division or synthetic division to find the quotients:

a. $\frac{x^3 - 2x^2 + 4x - 3}{x - 1}$

b. $\frac{2x^3 - 5x + 6}{x + 2}$

6. Simplify the following rational expressions fully. Be careful to determine which require multiplication/division and which involve addition and subtraction! You need common denominators for the latter type but not the former.

a. $\frac{2}{x} - \frac{3}{x+1}$ b. $\frac{x^2 - 3x - 4}{2x^2 - 32} \cdot (x+1)^{-2}$ c. $\frac{3}{x-2} + \frac{x-1}{x^2 - 4}$

d. $\frac{2}{3} - \frac{x-2}{3x-3}$

8. Condense into a single logarithm and then evaluate.

a. $\log_{12} 3 + 2\log_{12} 2$ b. $2\log_6 3 - \log_6 54$ c. $\log_8 28 - \log_8 7$

d. $\log_2 2\sqrt{2} + \log_2 \sqrt{2}$ e. $2\log 5 - \log 25$ f. $\frac{1}{2}\log_3 36 - \log_3 2$

9. Condense each of the following into a single logarithm.

a. $\frac{1}{3}(\log a + \log b) + \log c$ b. $2\log 2a - \log 3$ c. $\ln 6 - (\ln 3 + 3\ln 2)$

Answers

1a. 64 b. 1/8 c. 9/4

2a. $\frac{x^4}{2}$ b. $18x^3$ c. $\frac{3}{x^2 + 8x + 16}$ d. $\frac{4x^6}{9}$ e. $4xy$ f. $\frac{4}{x^4}$ g. $48x$ h. $15 + \frac{18}{x}$

3a. $3x(x+2)(x-2)$ b. $-3(x-1)(x-1)$ c. $-x(x-7)(x+3)$ d. $(2x+1)(x-5)$

e. $2(x-3)(x-2)(x+2)$ f. $(x^2 + 4)(x+1)(x-1)$

4a. $-7 + 4i$ b. $2 - 6i$ c. $11 + 2i$ d. $-10 - 10i$

5a. $x^2 - x + 3$ b. $2x^2 - 4x + 3$

6a. $\frac{-x+2}{x(x+1)}$ b. $\frac{1}{2(x+4)(x+1)}$ c. $\frac{4x+5}{(x+2)(x-2)}$ d. $\frac{x}{3(x-1)}$

7a. $-2x^3 + 12x^2 - 18x$ b. $x^3 + x^2 + 10$ c. $x^3 - x^2 - 13x + 4$

8a. 1 b. -1 c. 2/3 d. 2 e. 0 f. 1

9a. $\log(e \cdot \sqrt[3]{ab})$ b. $\log \frac{4a^2}{3}$ c. $\ln \frac{1}{4}$