

Practice Problems - Lecture 4

Problem 1. Evaluate the following:

(a) $(-5)^{-2}$; (b) -7^{-2} ; (c) $\left(\frac{4}{3}\right)^{-3}$.

Problem 2. Simplify each expression, writing answers without negative exponents:

(a) $5t^{-3}$; (b) $\frac{15s^{-4}}{5s^{-8}}$; (c) $\frac{15a^{-5}b^{-1}}{25a^{-2}b^4}$; (d) $(3p^{-4})^2(p^3)^{-1}$; (e) $\frac{12k^{-2}(k^{-3})^{-4}}{6k^5}$.

Problem 3. Evaluate the following:

(a) $\left(-\frac{8}{27}\right)^{1/3}$; (b) $(-64)^{1/4}$; (c) $27^{4/3}$; (d) $\left(\frac{4}{25}\right)^{-3/2}$.

Problem 4. Factor the expression $-3p^{-3/4} - 30p^{-7/4}$.

Problem 5. Simplify each expression (assume all variables are positive reals):

(a) $\sqrt[3]{9x} \cdot \sqrt[3]{4y}$;
(b) $-\sqrt[4]{\frac{3}{16}}$;
(c) $\sqrt[3]{250}$;
(d) $\sqrt{24m^6n^5}$;
(e) $\sqrt[3]{32} - 5\sqrt[3]{4} + 2\sqrt[3]{108}$;
(f) $4\sqrt{18x} - \sqrt{72x} + \sqrt{50x}$;
(g) $(3\sqrt{2} + \sqrt{3})(2\sqrt{3} - \sqrt{2})$.

Problem 6. Rationalize the denominator:

(a) $\sqrt[4]{\frac{7}{t^3}}$; (b) $\frac{\sqrt{7}}{\sqrt{3} - \sqrt{7}}$.

Answers:

1. (a) $\frac{1}{25}$; (b) $-\frac{1}{49}$; (c) $\frac{27}{64}$.

2. (a) $\frac{5}{t^3}$; (b) $3s^4$; (c) $\frac{3}{5a^3b^5}$; (d) $\frac{9}{p^{11}}$; (e) $2k^5$.

3. (a) $-\frac{2}{3}$; (b) undefined; (c) 81; (d) $\frac{125}{8}$.

4. $-3p^{-7/4}(p+10)$.

5. (a) $\sqrt[3]{36xy}$; (b) $-\frac{\sqrt[4]{3}}{2}$; (c) $5\sqrt[3]{2}$; (d) $2m^3n^2\sqrt{6n}$; (e) $3\sqrt[3]{4}$; (f) $11\sqrt{2x}$; (g) $5\sqrt{6}$.

6. (a) $\frac{\sqrt[4]{7t}}{t}$; (b) $-\frac{\sqrt{21}+7}{4}$.