

Intro to Calculus

Homework 12¹

Goals

I can simplify complicated expressions.

1. Simplify. Leave no negative exponents in your final solution.

a. $5(x+3)^2 - (x+3)^4$

f. $(1-x^3)^{\frac{1}{3}} - x^3(1-x^3)^{\frac{2}{3}}$

b. $8x^{-2} + x^{-3}$

g. $3(x-2)^{-\frac{1}{3}} - x(x-2)^{-\frac{4}{3}}$

c. $x^{\frac{1}{3}} - 9x^{\frac{4}{3}}$

h. $2(2+x)^{-\frac{1}{2}} + (1-x)(2+x)^{-\frac{3}{2}}$

d. $4(x+2)^{-5} - (x+2)^{-6}$

e. $x^2(x^2-1)^{-\frac{1}{2}} + (x^2-1)^{\frac{1}{2}}$

2. Simplify the following expressions-- in other words, rewrite without radical signs or negative exponents. Combine like terms and reduce to lowest terms.

a. $\frac{3^{-1} + 2^{-1}}{6^{-1}}$

f. $\left(a^{\frac{2}{5}}b^{-\frac{4}{3}}\right)\left(a^8b^3\right)^{\frac{2}{3}}$

b. $\frac{3^{-1} \cdot 2^{-1}}{6^{-1}}$

g. $\frac{(3^2)^{-\frac{1}{2}}(9^4)^{-1}}{(27)^{-3}}$

c. $\frac{\sqrt[3]{9}\sqrt[2]{3}}{\sqrt[6]{27}}$

h. $\frac{\sqrt{c^5d^{-9}}}{\sqrt{9c^3d^7}}$

d. $(36t^2)^{\frac{3}{2}}\left(16t^{\frac{1}{3}}\right)^{\frac{9}{4}}$

i. $\left(\frac{r^{\frac{2}{3}}}{s^5}\right)^{\frac{15}{9}}$

e. $\sqrt{\sqrt[3]{x^{18}}}$

¹ Great thanks to Prof. Scott Farrand's (CSUS) Math 29B Materials and to David Danielson (Butte College)

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j. $\sqrt[5]{x} \left(\sqrt[6]{x^5} \right) \left(\sqrt[7]{x^6} \right)$

m. $\left(s^{x^2+x} \right)^{\frac{1}{x}}$

k. $\frac{(8u^7)^{\frac{1}{5}} 2^{-5} a^{-4}}{2^{-3} a^5}$

n. $\frac{(2x)^{\frac{1}{2}} (3y)^{-2} (4x)^{\frac{3}{5}}}{(4x)^{-\frac{3}{2}} (3y)^2 (2x)^{\frac{1}{5}}}$

l. $\frac{\sqrt{x^{-12} y^{-7}}}{\sqrt{x^{-28} y^{-13}}}$

o. $\frac{\left(a^{\frac{3}{4}} b \right)^2 \left(ab^{\frac{1}{4}} \right)^3}{(ab)^{\frac{1}{2}}}$

3. Solve each equation algebraically.

a. $16^{2-3x} = 8^{5-6x}$

d. $\frac{5^{x+1}}{5^{1-x}} = \frac{1}{25^x}$

b. $\left(\frac{1}{27} \right)^{3x} = 9^{4x-5}$

e. $(11^{x+2})^x = (11^{x+2})^2$

c. $x^{\frac{1}{2}} \left(x^{\frac{4}{5}} - x^{\frac{8}{5}} \right)$

f. $125^{3x^3-2} \cdot 25^{3x-5} = 1$

4. Compute and simplify the expression. You may leave negative exponents.

a. $(3 + \sqrt{5})(2 - \sqrt{5})$

d. $x^{\frac{1}{5}} \left(3x^{\frac{4}{5}} + 5x^{-\frac{3}{5}} \right)$

b. $(4 - \sqrt{5})(5 + 2\sqrt{5})$

e. $\left(x^{\frac{1}{6}} - y^{\frac{1}{6}} \right) \left(x^{\frac{1}{6}} + y^{\frac{1}{6}} \right)$

c. $x^{\frac{1}{2}} \left(x^{\frac{4}{5}} - x^{\frac{8}{5}} \right)$

f. $\left(c^{\frac{3}{2}} + d^{\frac{1}{3}} \right) \left(2c^{\frac{3}{2}} - d^{-\frac{2}{3}} \right)$

5. Find the solution by factoring the expression.

a. $x^{-2} - x^{-1} - 6 = 0$

d. $x^{\frac{1}{3}} - 2x^{\frac{1}{6}} - 15 = 0$

b. $x^{-2} - 3x^{-1} + 2 = 0$

e. $x^{\frac{2}{5}} - 7x^{\frac{1}{5}} + 10 = 0$

c. $x^{\frac{2}{3}} - x^{\frac{1}{3}} - 6 = 0$

f. $x^{\frac{1}{4}} - 5x^{\frac{1}{2}} + 6 = 0$