

Section 1.4

Solutions and Hints

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for the book:

Precalculus, Mathematics for Calculus 4th Edition
by James Stewart, Lothar Redlin and Saleem Watson.

8. Simplify $(1 - x^2) / (x^3 - 1)$

$$\begin{aligned}(1 - x^2) / (x^3 - 1) &= [(1 - x)(1 + x)] / [(x - 1)(x^2 + x + 1)] \\ &= [-1*(x - 1)(1 + x)] / [(x - 1)(x^2 + x + 1)] \\ &= [-1*(1 + x)] / [(x^2 + x + 1)] \\ &= \mathbf{(-1 - x) / (x^2 + x + 1)}\end{aligned}$$

22. Simplify $[x / (x - 4)] - [3 / (x + 6)]$

Begin by getting a common denominator of $(x - 4)(x + 6)$

$$\begin{aligned}& [x*(x + 6) - 3*(x - 4)] / [(x - 4)(x + 6)] \\ &= (x^2 + 6x - 3x + 12) / [(x - 4)(x + 6)] \\ &= \mathbf{x^2 + 3x + 12 / [(x - 4)(x + 6)]}\end{aligned}$$

32. Simplify $[x / (x^2 + x - 2)] - [2 / (x^2 - 5x + 4)]$

First factor both denominators (to determine what common denominator to use).

$$\begin{aligned}x^2 + x - 2 &= (x - 1)(x + 2) \\ x^2 - 5x + 4 &= (x - 1)(x - 4)\end{aligned}$$

So the common denominator to use is: $(x - 1)(x + 2)(x - 4)$

$$\begin{aligned}& [x / (x^2 + x - 2)] - [2 / (x^2 - 5x + 4)] \\ &= [x*(x - 4) - 2*(x + 2)] / [(x - 1)(x + 2)(x - 4)] \\ &= (x^2 - 4x - 2x - 4) / [(x - 1)(x + 2)(x - 4)] \\ &= \mathbf{(x^2 - 6x - 4) / [(x - 1)(x + 2)(x - 4)]}\end{aligned}$$

48. Simplify $[(x + h)^{-3} - x^{-3}] / h$

$$\begin{aligned} [(x + h)^{-3} - x^{-3}] / h &= [1 / (x + h)^3 - 1/x^3] / h \\ &= ([x^3 - (x + h)^3] / [x^3 * (x + h)^3]) / h \\ &= [(x^3 - (x + h)^3) / [x^3 * (x + h)^3 * h]] \\ &= (x^3 - x^3 - 3x^2h - 3xh^2 - h^3) / [x^3 * (x + h)^3 * h] \\ &= (-3x^2h - 3xh^2 - h^3) / [x^3 * (x + h)^3 * h] \\ &= [h * (-3x^2 - 3xh - h^2)] / [x^3 * (x + h)^3 * h] \\ &= \mathbf{(-3x^2 - 3xh - h^2) / [x^3 * (x + h)^3]} \end{aligned}$$

62. Rationalize the denominator: $\frac{y}{\sqrt{3} + \sqrt{y}}$

$$\frac{y}{\sqrt{3} + \sqrt{y}} * \frac{\sqrt{3} - \sqrt{y}}{\sqrt{3} - \sqrt{y}} = \frac{y * (\sqrt{3} - \sqrt{y})}{3 - y}$$