Calculus Worksheet #1 Unit 5 Selected Solutions

Use the chain rule to find dy/dx for each of the following functions.

The Chain Rule : If y = f(u) and u = g(x), then dy/dx = (dy/du)(du/dx)

4. $y = (1 - 5x)^3$

$y = f(u) = u^3$ and $u = g(x) = 1 - 5x$

$dy/du = 3u^2$ $du/dx = -5$

$dy/dx = 3(1 - 5x)^2(-5)$

$dy/dx = -15(1 - 5x)^2$

8. $y = (x^2 - 1)^7$

$y = f(u) = u^7$ and $u = g(x) = x^2 - 1$

$dy/du = 7u^6$ $du/dx = 2x$

$dy/dx = 7(x^2 - 1)^6(2x)$

$dy/dx = 14x(x^2 - 1)^6$

12. $y = \dfrac{1}{(2x - 5)^3}$

$y = (2x - 5)^{-3}$

$y = f(u) = u^{-3}$ and $u = g(x) = 2x - 5$

$dy/du = -3u^{-4}$ $du/dx = 2$

$dy/dx = -3(2x - 5)^{-4}(2)$

$dy/dx = -6(2x - 5)^{-4}$

16. $y = \sqrt[3]{4 - 5x}$

$y = (4 - 5x)^{(1/3)}$

$y = f(u) = u^{(1/3)}$ and $u = g(x) = 4 - 5x$

$dy/du = (1/3)u^{(-2/3)}$ $du/dx = -5$

$dy/dx = (1/3)(4 - 5x)^{(-2/3)}(-5)$

$dy/dx = (-5/3)(4 - 5x)^{(-2/3)}$