Answers to Chain Rule Day 2 Homework

1) $\frac{dy}{dx} = 5(x^3 + 4)^4 \cdot 3x^2$

2) $\frac{dy}{dx} = 4(x^3 + 2)^3 \cdot 3x^2$

3) $\frac{dy}{dx} = (-5x^5 - 1)^2 \cdot 20x^3 + (5x^4 - 1) \cdot 2(-5x^5 - 1) \cdot -25x^4$

4) $\frac{dy}{dx} = (x^5 + 4) \cdot \frac{1}{4}(x^4 + 1)^{-\frac{3}{4}} \cdot 4x^3 + (x^4 + 1)^{\frac{1}{4}} \cdot 5x^4$

5) $f'(x) = 2 \cdot \frac{2x^3 + 5}{x^4 - 3} \cdot \frac{(x^4 - 3) \cdot 6x^2 - (2x^3 + 5) \cdot 4x^3}{(x^4 - 3)^2}$

6) $f'(x) = 2 \cdot \frac{-5x^2 + 1}{3x^4 + 1} \cdot \frac{(3x^4 + 1) \cdot -10x - (-5x^2 + 1) \cdot 12x^3}{(3x^4 + 1)^2}$

7) $f'(x) = -2(5x + 2)^{-3} \cdot 5$

8) $f'(x) = \frac{1}{3}(2x^2 + 1)^{-\frac{2}{3}} \cdot 4x$

9) $\frac{dy}{dx} = (5x^2 + 2)^{\frac{1}{3}} \cdot 12x^3 + (3x^4 + 4) \cdot \frac{1}{3}(5x^2 + 2)^{-\frac{2}{3}} \cdot 10x$

$= \frac{2x(105x^4 + 36x^2 + 20)}{3(5x^2 + 2)^{\frac{2}{3}}}$

10) $\frac{dy}{dx} = \frac{1}{3} \cdot \left(\frac{2x^5 - 5}{5x^2 - 3}\right)^{-\frac{2}{3}} \cdot \frac{(5x^2 - 3) \cdot 10x^4 - (2x^5 - 5) \cdot 10x}{(5x^2 - 3)^2}$

$= \frac{10x(3x^5 - 3x^3 + 5)}{3(2x^5 - 5)^{\frac{2}{3}} \cdot (5x^2 - 3)^{\frac{4}{3}}}$