

Answers to Practicing Derivative Rules (chain rule not included)

- 1) $\frac{dy}{dx} = \frac{3}{5x^{\frac{4}{5}}}$ 2) $\frac{dy}{dx} = \frac{1}{2} + \frac{2}{25x^{\frac{4}{5}}}$ 3) $\frac{dy}{dx} = -9x^2 + 5x - 2$
- 4) $\frac{dy}{dx} = \frac{1}{3x^{\frac{1}{3}}} - \frac{4}{3x^{\frac{2}{3}}} + \frac{5}{4x^{\frac{3}{4}}}$ 5) $\frac{dy}{dx} = \frac{16x^3}{5} + x^2 - \frac{4}{5x^{\frac{4}{5}}}$
- 6) $\frac{dy}{dx} = (3x^4 + 3) \cdot -12x^2 + (-4x^3 + 3) \cdot 12x^3$
 $= -84x^6 + 36x^3 - 36x^2$
- 7) $\frac{dy}{dx} = (-3x^4 + 2x^3 - 4) \cdot 9x^2 + (3x^3 + 1)(-12x^3 + 6x^2)$
 $= -63x^6 + 36x^5 - 12x^3 - 30x^2$
- 8) $\frac{dy}{dx} = (3x^4 - 3) \cdot 3x^2 + x^3 \cdot 12x^3$
 $= 21x^6 - 9x^2$
- 9) $\frac{dy}{dx} = (2x^5 + 3) \cdot 5x^4 + (x^5 - 5) \cdot 10x^4$
 $= 20x^9 - 35x^4$
- 10) $\frac{dy}{dx} = 4x^4 \cdot -15x^2 + (-5x^3 + 3) \cdot 16x^3$
 $= -140x^6 + 48x^3$
- 11) $\frac{dy}{dx} = 4x^3 \cdot 2x + (x^2 + 5) \cdot 12x^2$
 $= 20x^4 + 60x^2$
- 12) $\frac{dy}{dx} = -\frac{2 \cdot 20x^4}{(4x^5 + 3)^2}$
 $= -\frac{40x^4}{16x^{10} + 24x^5 + 9}$
- 13) $f'(x) = \frac{(x^2 + 5) \cdot 8x - 4x^2 \cdot 2x}{(x^2 + 5)^2}$
 $= \frac{40x}{x^4 + 10x^2 + 25}$
- 14) $\frac{dy}{dx} = \frac{(3x^4 + 2)(5x^4 + 8x) - (x^5 + 4x^2) \cdot 12x^3}{(3x^4 + 2)^2}$
 $= \frac{3x^8 - 24x^5 + 10x^4 + 16x}{9x^8 + 12x^4 + 4}$
- 15) $f'(x) = -\frac{3 \cdot 9x^2}{(3x^3 - 2)^2}$
 $= -\frac{27x^2}{9x^6 - 12x^3 + 4}$
- 16) $\frac{dy}{dx} = \frac{(2x^2 - 5) \cdot 8x^3 - 2x^4 \cdot 4x}{(2x^2 - 5)^2}$
 $= \frac{8x^5 - 40x^3}{4x^4 - 20x^2 + 25}$
- 17) $f'(x) = \frac{(3x^5 + 2)(12x^3 + 9x^2) - (3x^4 + 3x^3 + 5) \cdot 15x^4}{(3x^5 + 2)^2}$
 $= \frac{-9x^8 - 18x^7 - 75x^4 + 24x^3 + 18x^2}{9x^{10} + 12x^5 + 4}$
- 18) $\frac{d^2y}{dx^2} = 30x + 6$ 19) $\frac{d^2y}{dx^2} = 36x^2$ 20) $f''(x) = 80x^3 + 12x^2 - 6x$