

Practice with Derivatives And Partial Derivatives Answers:

- a) $f(x) = 2x^4 \Rightarrow f'(x) = 8x^3$
 b) $f(x) = 4x^{0.5} \Rightarrow f'(x) = 2x^{-0.5} = 2/x^{0.5}$
 c) $f(x) = 6x^{-1} \Rightarrow f'(x) = -6x^{-2} = -6/x^2$
 d) $f(x) = 4x^{-0.25} \Rightarrow f'(x) = -1x^{-1.25} = -1/x^{1.25}$
 e) $f(x) = 35 \Rightarrow f'(x) = 0$
- f) $h(x) = 2x^2 + 9x^{-3} \Rightarrow h'(x) = 4x - 27x^{-4}$
 g) $h(x) = 4x^{-0.5} + 7x^4 \Rightarrow h'(x) = -2x^{-1.5} + 28x^3$
 h) $h(x) = 6 + 5x^2 \Rightarrow h'(x) = 10x$
 i) $h(x) = 3 + 4x + 5x^2 \Rightarrow h'(x) = 4 + 10x$
 j) $h(x) = 1 + 3x + 8x^3 + 10x^4 \Rightarrow h'(x) = 3 + 24x^2 + 40x^3$
- k) $h(x) = (3 + x^4)(2 + x^3) \Rightarrow h'(x) = 4x^3(2 + x^3) + 3x^2(3 + x^4)$
 l) $h(x) = (20 + x^{-2})(4 - x^6) \Rightarrow h'(x) = -2x^{-3}(4 - x^6) - 6x^5(20 + x^{-2})$
 m) $h(x) = (10 + x^5)(8 - x^4) \Rightarrow h'(x) = 5x^4(8 - x^4) + 4x^{-5}(10 + x^5)$
 n) $h(x) = (3x + x^2)(12 + x^8) \Rightarrow h'(x) = (3 + 2x)(12 + x^8) + 8x^7(3x + x^2)$
 o) $h(x) = (1 + x^2)(4 + x^3)(2 + x) \Rightarrow h'(x) = 2x(4 + x^3)(2 + x) + 3x^2(1 + x^2)(2 + x) + (1 + x^2)(4 + x^3)$
- p) $h(x) = (7 + x^8)^{-4} \Rightarrow h'(x) = -4(7 + x^8)^{-5} 8x^7$
 q) $h(x) = (15 + x^{-2})^6 \Rightarrow h'(x) = 6(15 + x^{-2})^5 (-2x^{-3})$
 r) $h(x) = (12 + 4x^{0.25})^{0.5} \Rightarrow h'(x) = 0.5(12 + 4x^{0.25})^{-0.5} x^{-0.75}$
 s) $h(x) = (4x + 0.5x^2)^{-3} \Rightarrow h'(x) = -3(4x + 0.5x^2)^{-4} (4 + x)$
 t) $h(x) = (14 + 4x^2 - 0.25x^8)^{-0.5} \Rightarrow h'(x) = -0.5(14 + 4x^2 - 0.25x^8)^{-1.5} (8x - 2x^7)$
- u) $h(x) = (25 + 4x^{0.25}) / (8 + 7x^2) \Rightarrow h'(x) = \frac{x^{-0.75}(8 + 7x^2) - 14x(25 + 4x^{0.25})}{(8 + 7x^2)^2}$
 v) $h(x) = (4 + 3x^{-1}) / (5 - 6x^3) \Rightarrow h'(x) = \frac{-3x^{-2}(5 - 6x^3) + 18x^2(4 + 3x^{-1})}{(5 - 6x^3)^2}$
 w) $h(x) = (12 + 0.5x^2) / (16 + 5x^{-3}) \Rightarrow h'(x) = \frac{x(16 + 5x^{-3}) + 15x^{-4}(12 + 0.5x^2)}{(16 + 5x^{-3})^2}$
 x) $h(x) = (14x - 18x^5) / (17 + x^8) \Rightarrow h'(x) = \frac{(14 - 90x^4)(17 + x^8) - 8x^7(14x - 18x^5)}{(17 + x^8)^2}$
 y) $h(x) = (13 + 5x^2 + 3x^4) / (1 + 13x + 5x^2) \Rightarrow h'(x) = \frac{(10x + 12x^3)(1 + 13x + 5x^2) - (13 + 10x)(13 + 5x^2 + 3x^4)}{(1 + 13x + 5x^2)^2}$

$$\begin{aligned}
z) \quad & f(x,z) = 5x^{0.5}z^{0.5} \quad \Rightarrow f_x(x,z) = 2.5x^{-0.5}z^{0.5} \text{ and } f_z(x,z) = 2.5x^{0.5}z^{-0.5} \\
aa) \quad & f(x,z) = 5x^3 + 10z^2 \quad \Rightarrow f_x(x,z) = 15x^2 \text{ and } f_z(x,z) = 20z \\
bb) \quad & f(x,z) = 5x^4/z \quad \Rightarrow f_x(x,z) = 20x^3/z \text{ and } f_z(x,z) = -5x^4/z^2 \\
cc) \quad & f(x,z) = x^2 - 8xz + 4z^2 \quad \Rightarrow f_x(x,z) = 2x - 8z \text{ and } f_z(x,z) = -8x + 8z
\end{aligned}$$