Ableiten mit Summen-, Faktor-, Produkt- und Quotientenregel - Lösung

Lösung: jeweilige Ableitungsfunktion $f'(x)$:

a) $f'(x) = 9x^2 - 4x;$

b) $f'(x) = \frac{3}{2}x + \frac{1}{2};$

c) $f_a{}'(x) = 50ax^9;$

d) $f'(x) = \left[x^{\frac{3}{2}}\right]' = \frac{3}{2}x^{\frac{1}{2}} = \frac{3}{2}\sqrt{x};$

e) $f_c{}'(x) = 5\frac{c}{x^6};$

f) $f'(x) = -\frac{1}{x^2} - \frac{4}{x^3} - \frac{9}{x^4};$

g) $f'(x) = \left[x^{-\frac{2}{3}}\right]' = -\frac{2}{3}x^{-\frac{5}{3}} = -\frac{2}{3\sqrt[3]{x^5}};$

h) $f'(x) = 2x(1-x^2) + x^2(-2x) = 2x - 2x^3 - 2x^3 = 2x - 4x^3;$

i) $f'(x) = (4x-1)(x-3x^2) + (2x^2-x)(1-6x) = \cdots = -24x^3 + 15x^2 - 2x;$

j) $f'(x) = [(x^2-5)(x^2-5)]' = 2x(x^2-5) + (x^2-5)2x = 4x(x^2-5) = 4x^3 - 20x;$

k) $f'(x) = 5x^4 - 12x^3 - 6x^2 + 12x;$

l) $f'(x) = \frac{(1+x^2)2x-(x^2-1)2x}{(1+x^2)^2} = \frac{2x(1+x^2-x^2+1)}{(1+x^2)^2} = \frac{4x}{(1+x^2)^2};$

m) $f'(x) = \frac{(x+2)1-(x-2)1}{(x+2)^2} = \frac{x+2-x+2}{(x+2)^2} = \frac{4}{(x+2)^2};$

n) $f'(x) = \frac{(1-x^2)0-3(-2x)}{(1-x^2)^2} = \frac{6x}{(1-x^2)^2};$

o) $f'(x) = \frac{(2-3x)2-(3+2x)(-3)}{(2-3x)^2} = \frac{4-6x+9+6x}{(2-3x)^2} = \frac{13}{(2-3x)^2};$

p) $f'(x) = \frac{(2-x)^2 3-3x[(-1)(2-x)+(2-x)(-1)]}{(2-x)^4} = \frac{3(2-x)^2+6x(2-x)}{(2-x)^4} = \frac{3(2-x)+6x}{(2-x)^3} = \frac{3x+6}{(2-x)^3};$