Nr.3.) a) $f(x) = x \cdot \sin(3x) \Rightarrow f'(x) = 1 \cdot \sin(3x) + x \cdot \cos(3x) \cdot 3$

$f'(x) = \sin(3x) + 3x \cdot \cos(3x)$

b) $f(x) = (3x+4)^2 \cdot \sin(x)$

$f'(x) = 2 \cdot (3x+4) \cdot 3 \cdot \sin(x) + (3x+4)^2 \cdot \cos(x)$

$f'(x) = 6 \cdot (3x+4) \cdot \sin(x) + (3x+4)^2 \cdot \cos(x)$

c) $f(x) = x^{-1} \cdot (2x+3)^2$

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

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

$f'(x) = \frac{-4x^2 - 12x - 9 + 8x^2 + 12x}{x^2} = \frac{4x^2 - 9}{x^2} = 4 - \frac{9}{x^2}$

d) $f(x) = (5-4x)^3 \cdot (1-4x)$

$f'(x) = 3 \cdot (5-4x)^2 \cdot (-4) \cdot (1-4x) + (5-4x)^3 \cdot (-4)$

$f'(x) = (5-4x)^2 \cdot [-12 \cdot (1-4x) - 4(5-4x)]$

$f'(x) = (5-4x)^2 \cdot [-12 + 48x - 20 + 16x]$

$f'(x) = (5-4x)^2 \cdot [-32 + 64x] = 32 \cdot [2x-1] \cdot (5-4x)^2$

e) $f(x) = (5-4x)^3 \cdot x^{-2}$

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

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

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

$f'(x) = \frac{(5-4x)^2 \cdot [-12x - 2 \cdot (5-4x)]}{x^3}$

$f'(x) = \frac{(5-4x)^2 \cdot [-12x + 8x - 10]}{x^3} = \frac{(5-4x)^2 \cdot [-4x-10]}{x^3}$

Nr. 3) f) $F(x) = 3x \cdot \cos(2x)$

$f'(x) = 3 \cdot \cos(2x) + 3x \cdot (-\sin(2x)) \cdot 2$

$F'(x) = 3 \cdot \cos(2x) - 6x \cdot \sin(2x)$

g) $F(x) = 3x \cdot (\sin(x))^2$

$f'(x) = 3 \cdot (\sin(x))^2 + 3x \cdot 2(\sin(x))^1 \cdot \cos(x)$

$F'(x) = 3 \cdot (\sin(x))^2 + 6x \cdot \sin(x) \cdot \cos(x)$

h) $F(x) = (2x-1)^2 \cdot \sqrt{x} = (2x-1)^2 \cdot x^{\frac{1}{2}}$

$F'(x) = 2 \cdot (2x-1) \cdot 2 \cdot \sqrt{x} + (2x-1)^2 \cdot \frac{1}{2} x^{-\frac{1}{2}}$

$F'(x) = 4(2x-1) \cdot \sqrt{x} + \frac{(2x-1)^2}{2 \cdot \sqrt{x}}$

i) $F(x) = 0{,}5x^2 \cdot \sqrt{4-x} = \frac{1}{2} x^2 \cdot (4-x)^{\frac{1}{2}}$

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

$F'(x) = x\sqrt{4-x} + \frac{-x^2}{2 \cdot 2 \cdot \sqrt{4-x}} = x\sqrt{4-x} - \frac{x^2}{4\sqrt{4-x}}$

O. Fell