

MATH180 Elements of Calculus Quiz 3
Janet Vassilev

- (1) Let $f(x) = g(x)h(x)$ and $F(x) = \frac{g(x)}{h(x)}$. If $g(-2) = 7$, $h(-2) = 3$, $g'(-2) = 4$ and $h'(-2) = -1$, determine $f'(-2)$ and $F'(-2)$.

$$f'(-2) = g'(-2)h(-2) + g(-2)h'(-2) = 4 \cdot 3 + 7(-1) = 5$$

$$F'(-2) = \frac{h'(-2)g(-2) - g(-2)h'(-2)}{(h(-2))^2} = \frac{3 \cdot 4 - 7(-1)}{3^2} = \frac{19}{9}$$

- (2) Find derivatives of the following:

(a) $f(x) = (3\sqrt[3]{x^4} - x)^5$.

$$f'(x) = 5(3\sqrt[3]{x^4} - x)^4(4\sqrt[3]{x} - 1)$$

(b) $h(y) = \frac{5}{\sqrt{y} + 1}$.

$$h'(y) = -5(\sqrt{y} + 1)^{-2} \left(\frac{1}{2}y^{-1/2}\right)$$

$$\text{or } \frac{(\sqrt{y} + 1) \cdot 0 - 5 \cdot \frac{1}{2}y^{-1/2}}{(\sqrt{y} + 1)^2}$$

(c) $g(t) = t^2(3t + 4)^3$.

$$g'(t) = t^2 \cdot 3(3t + 4)^2 \cdot 3 + 2t(3t + 4)^3$$