

DIFFERENTIATION WORKSHEET

Exercise 1. Calculate the derivative using the limit definition for the following functions:

(1) $f(x) = x + 3$

(2) $g(x) = 2x - 5$

(3) $h(x) = 2x^2 + x - 15$. Check that $h(x) = f(x)g(x)$, and that $h'(x) = f'(x)g(x) + f(x)g'(x)$

(4) **Challenge:** $j(x) = \frac{1}{x+1}$

Exercise 2. Calculate the derivative using the differentiation rules for the following functions:

(1) $f(x) = 15x^{20} - 5x^{10} + 6x$

(2) $g(x) = 5e^x + x^3 - 4x^2$

(3) $h(x) = 2x^2 + x - 15$

(4) $j(x) = 2x^{-5} + \frac{1}{x} + 6e^x$