Question 1 **(6 marks)**

(a)   Differentiate the function $f(x) = x^2 \ln(4x + 3)$.   (2 marks)

(b)   Determine a fully simplified expression for $g(x)$, given that $g'(x) = \dfrac{3x}{3x^2 + 1}$ and $g(1) = \ln(6)$.   (4 marks)