

Question 1**(9 marks)**

Consider the derivative function $f'(x) = \frac{4x}{x^2 + 3}$.

(a) Determine the rate of change of $f'(x)$ when $x = 1$.

(3 marks)

(b) Determine $f(x)$ given that $f(1) = \ln(32)$.

(4 marks)

(c) Determine $\frac{d}{dt} \int_t^3 f(x) dx$.

(2 marks)