Question 16 **(8 marks)**

Let $f(x)$ be a function such that $f(-2) = 4, f(-1) = 0, f(0) = -1, f(1) = 0$ and $f(3) = 2$.
Further, $f'(x) < 0$ for $-2 \leq x < 0, f'(0) = 0$ and $f'(x) > 0$ for $0 < x \leq 3$.

(a) Evaluate the following definite integrals:

(i) $\int_0^3 f'(x)\,dx.$ (2 marks)

(ii) $\int_{-2}^3 f'(x)\,dx.$ (2 marks)

(b) What is the area bounded by the graph of $f'(x)$ and the x axis between $x = -2$ and $x = 3$? Justify your answer. (4 marks)