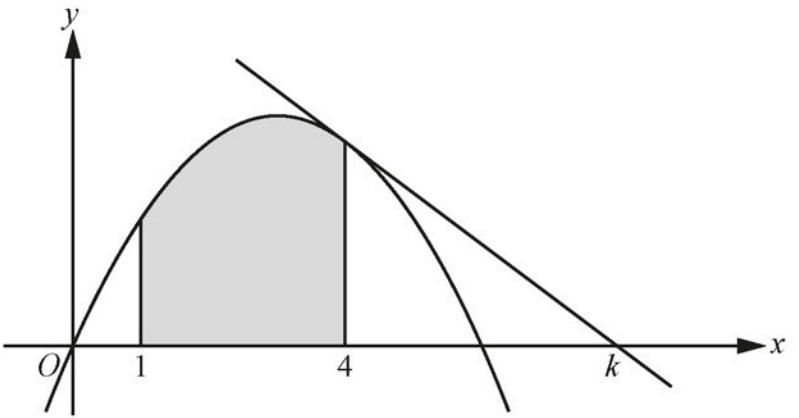
8 **(a)** The quadratic polynomial $ax^2 + bx$, where a and b are constants, is denoted by $\mathrm{f}(x)$.

Use differentiation from first principles to determine, in terms of a, b and x, an expression for $\mathrm{f}'(x)$. **[4]**

(b)



The diagram shows the quadratic curve $y = ax^2 + bx$, where a and b are constants. The shaded region is enclosed by the curve, the x-axis and the lines $x = 1$ and $x = 4$.

The tangent to the curve at $x = 4$ intersects the x-axis at the point with coordinates $(k, 0)$.

Given that the area of the shaded region is 9 units^2, and the gradient of this tangent is $-\frac{3}{4}$, determine the value of k. **[7]**