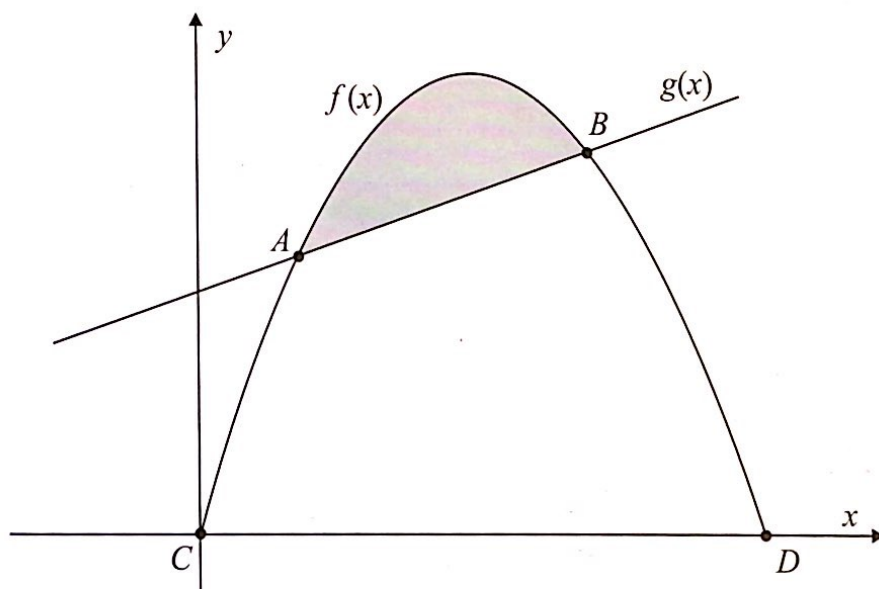


**QUESTION 6 (25 MARKS)**

**Question 6 (a)**

$$\begin{aligned}
 f(x) &= g(x) \\
 5x - x^2 &= x + 3 \\
 0 &= x^2 - 4x + 3 \\
 0 &= (x-1)(x-3) \\
 \therefore x &= 1, 3 \\
 g(1) &= 1 + 3 = 4 \\
 g(3) &= 3 + 3 = 6 \\
 A(1, 4), B(3, 6)
 \end{aligned}$$



**Question 6 (b)**

$$\begin{aligned}
 |A| &= \int_1^3 (f(x) - g(x)) dx \\
 &= \int_1^3 (-x^2 + 4x - 3) dx \\
 &= \left[-\frac{1}{3}x^3 + 2x^2 - 3x\right]_1^3 \\
 &= \left\{-\frac{1}{3}(3)^3 + 2(3)^2 - 3(3)\right\} - \left\{-\frac{1}{3}(1)^3 + 2(1)^2 - 3(1)\right\} \\
 &= -9 + 18 - 9 + \frac{1}{3} - 2 + 3 \\
 &= \frac{4}{3}
 \end{aligned}$$

**Question 6 (c)**

$$\begin{aligned}
 C(0, 0), D(5, 0) \\
 \text{Average value} &= \frac{1}{5-0} \int_0^5 f(x) dx \\
 &= \frac{1}{5} \int_0^5 (5x - x^2) dx \\
 &= \frac{1}{5} \left[\frac{5}{2}x^2 - \frac{1}{3}x^3\right]_0^5 \\
 &= \frac{1}{5} \left\{\frac{5}{2}(5)^2 - \frac{1}{3}(5)^3\right\} - \{0\} \\
 &= \frac{1}{5} \left(\frac{125}{2} - \frac{125}{3}\right) = \frac{25}{6}
 \end{aligned}$$