

**1. March/2023/Paper\_9709/22/No.3**

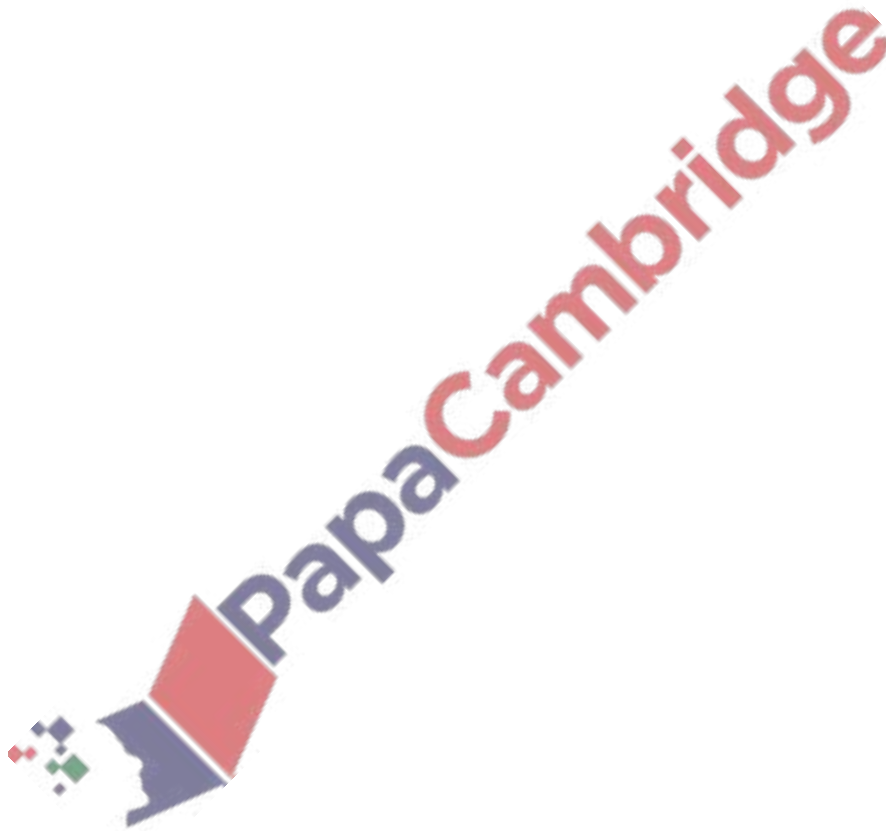
The polynomial  $p(x)$  is defined by

$$p(x) = ax^3 - ax^2 + ax + b,$$

where  $a$  and  $b$  are constants. It is given that  $(x + 2)$  is a factor of  $p(x)$ , and that the remainder is 35 when  $p(x)$  is divided by  $(x - 3)$ .

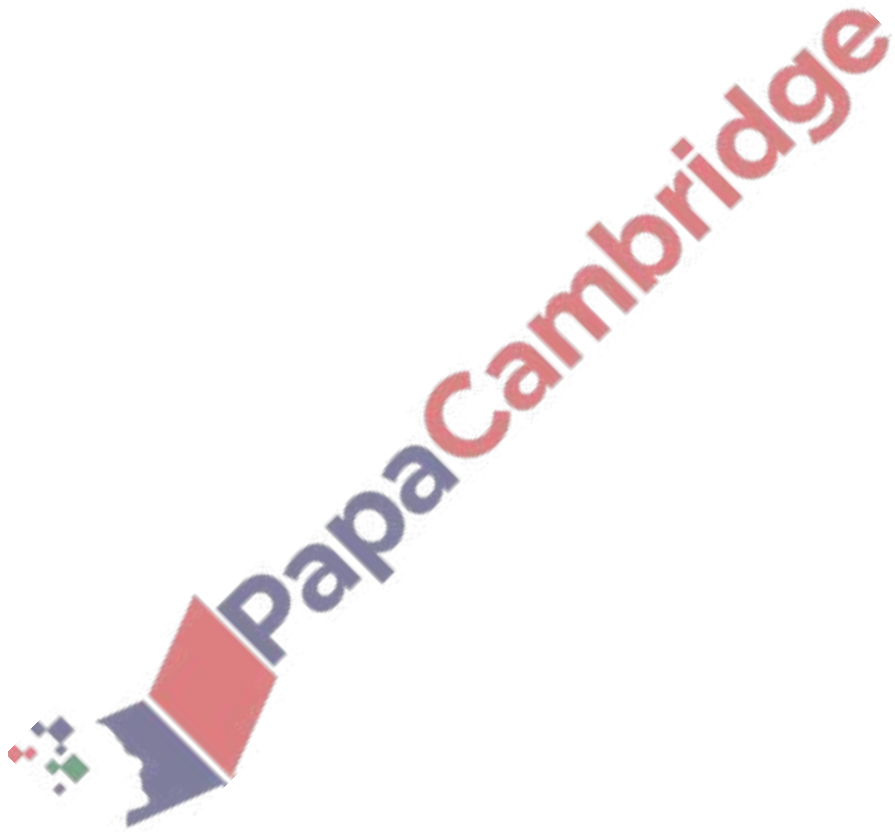
**(a)** Find the values of  $a$  and  $b$ .

[5]



(b) Hence factorise  $p(x)$  and show that the equation  $p(x) = 0$  has exactly one real root.

[3]

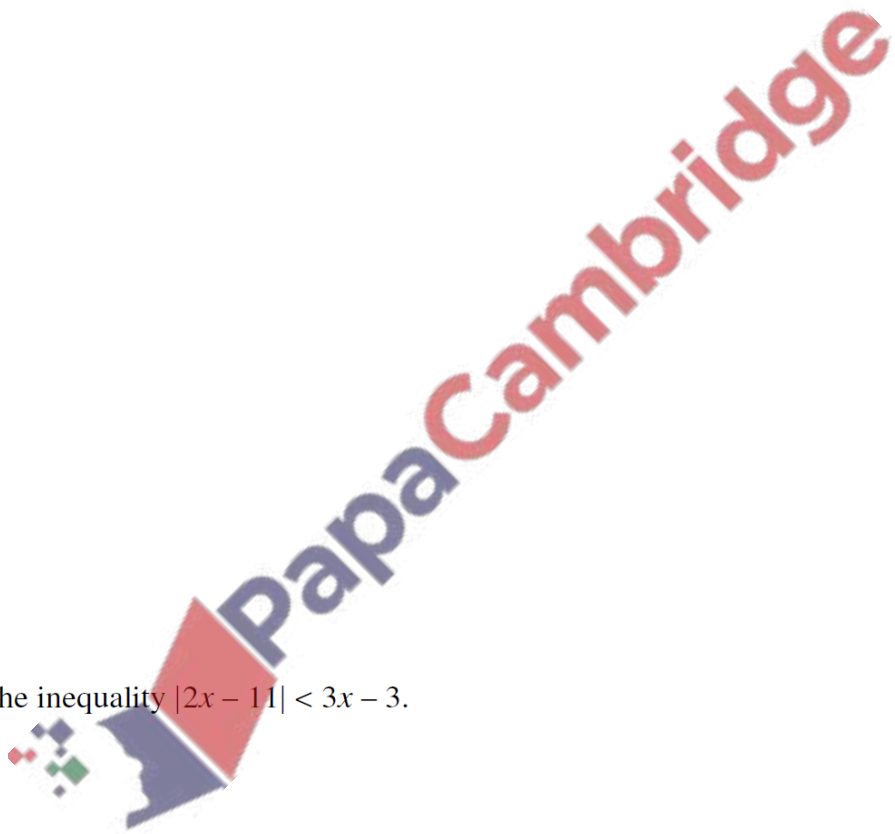


(a) Sketch, on the same diagram, the graphs of  $y = |2x - 11|$  and  $y = 3x - 3$ .

[2]

(b) Solve the inequality  $|2x - 11| < 3x - 3$ .

[3]



(c) Find the smallest integer  $N$  satisfying the inequality  $|2 \ln N - 11| < 3 \ln N - 3$ .

[2]

