

## Self-assessment: 3 Algebraic structures

**1. Do not use a calculator to answer this question.**

Solve the equation  $x^4 - 5x^2 + 4 = 0$ .

*(accessible to students on the path to grade 3 or 4) [5 marks]*

**2. Solve the equation  $2e^{2x} = x + 3$ .**

*(accessible to students on the path to grade 3 or 4) [4 marks]*

**3. Sketch the graph of  $y = \frac{x^2 - 1}{x^2 + 1}$ , indicating clearly the equations of any asymptotes and maximum or minimum points.**

*(accessible to students on the path to grade 3 or 4) [4 marks]*

**4. Find the exact solution of the equation  $e^{2x} + 2e^x = 15$ .**

*(accessible to students on the path to grade 5 or 6) [5 marks]*

**5. Do not use a calculator to answer this question.**

(a) Sketch the graph of  $y = \ln x$ .

*(accessible to students on the path to grade 3 or 4)*

(b) Show that  $\log_3(9x^2) - \log_3(6x) = \log_3 x - \log_3 2 + 1$ .

(c) Hence solve the equation  $\log_3(9x^2) - \log_3(6x) = 2x \log_3 x - \log_3 2 + 1$ .

*(accessible to students on the path to grade 5 or 6)*

*[12 marks]*