

Self-assessment: 4 Algebraic structures

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

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

2. 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]

3. Find the range of values of x for which $2e^{2x} \leq x + 3$.

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

4. Find the exact coordinates of the points of intersection of the graphs of $y = x^2 + 1$ and $y = 5 - x$.

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

5. (a) Find the value of the parameter k for which the following system of equations is consistent:

$$\begin{cases} x - 2y + z = 5 \\ 2x + y - z = -1 \\ x + 8y - 5z = k \end{cases}$$

- (b) For the value of k found above, find the general solution of the system.

(accessible to students on the path to grade 5 or 6) [11 marks]