

## KEY

## Section 3: Geometry

### Section 1: Algebra

- 1.1  $-x + 5$
- 1.2  $1 + \sum_{i=1}^n a_i$
- 1.3  $-2, -2/9, 2/3$
- 1.4 a
- 1.5  $H \cap K = \{e\}$ , *i.e.* order is 1
- 1.6 a, b, c
- 1.7a, b, c
- 1.8 Trace = 5, determinant = 4
- 1.9  $\lambda^2 - 1$  for both
- 1.10 c

### Section 2: Analysis

- 2.1 2
- 2.2 0
- 2.3 (a) convergent; (b) convergent
- 2.4 a, b, c
- 2.5  $-\frac{1 \cdot 3 \cdot 5 \cdot 1}{2 \cdot 4 \cdot 6 \cdot 7}$
- 2.6  $\frac{1}{2} f'(a)$
- 2.7 Minimum at  $(0, 0)$
- 2.8  $1 - i$
- 2.9  $-\frac{\pi i}{2}$
- 2.10 Residue at  $z = 0$  is 2; residue at  $z = 1$  is 3

- 3.1  $(6, \frac{\pi}{9})$
- 3.2  $4\sqrt{2}$
- 3.3 (a) ellipse, (b) hyperbola
- 3.4  $\frac{x^2}{16} - \frac{y^2}{9} = 1$
- 3.5 (a)  $\frac{x^2}{a^2} - \frac{y^2}{b^2} - 1 = 0$ ; (b)  $(x - R)^2 + y^2 = R^2$
- 3.6  $\pi$
- 3.7  $\frac{x+1}{5} = \frac{y-3}{-1} = \frac{z+\frac{1}{2}}{2}$
- 3.8  $a = \pm 6$
- 3.9 0
- 3.10  $x = vt \cos \omega t, y = vt \sin \omega t.$