

KEY

Section 3: Geometry

Section 1: Algebra

1.1 $2, 2 \pm i$

1.2 t

1.3 a,b,c

1.4 a. normal subgroup; b. subgroup, but not normal; c. not a subgroup

1.5 6

1.6

$$\begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}.$$

1.7 Any three linearly independent matrices with the entries of the first row adding up to zero

1.8 $\lambda^2 - \frac{2}{3}\lambda + \frac{1}{3}$

1.9 a,b,c

1.10 $(a + d)^2 < 4(ad - bc)$

Section 2: Analysis

2.1 b,c

2.2 a,b

2.3 a. $[-1, 1]$; b. $[-1, 1] \setminus \{0\}$; c. \emptyset

2.4 $f(x) = 0$ for all cases a,b,c

2.5 a. false; b. false; c. true

2.6 a,c

2.7 a. $>$; b. $>$

2.8 $3^{n-2}e^{3x}[9x^2 + 6nx + n(n-1)]$

2.9 $\pm(1 + i)$

2.10 a. $f'(0) = 0$; b. $f'(x + ix) = 2x$

3.1 $\frac{5}{2} \sin \frac{2\pi}{5}$

3.2 $f(D) = 0$

3.3 a

3.4 b

3.5 $\frac{x}{x_1} + \frac{y}{y_1} = 2$

3.6 $\lambda = -10/9$

3.7 $p^2 = r^2(l^2 + m^2 + n^2)$

3.8 $4x + 2y - 7z + 35 = 0$

3.9 $y + tx = 2at + at^3$

3.10 $\frac{1}{x^2} + \frac{1}{y^2} + \frac{1}{z^2} = \frac{9}{p^2}$

Note: Please accept any answer which is correct, but expressed in an equivalent, though different, form, where applicable.