

Section 1: Algebra

1.1 36

1.2 2

1.3 b,c

1.4 b. The multiplicative group $\{+1, -1\}$.c. The multiplicative group $\mathbb{C} \setminus \{0\}$.

1.5 a,c

1.6 b

1.7 a,b

1.8 b,c

1.9 a,b,c

1.10 c

Section 2: Analysis

2.1 b,c

2.2 b,c

2.3 $-2 \leq x \leq 0$

2.4 a,c

2.5 a,c

2.6 a,b

2.7

$$\frac{ne^{(n+2)x} - (n+1)e^{(n+1)x} + e^x}{(e^x - 1)^2}$$

2.8 $>$ 2.9 $\frac{1.3.5}{2.4.6} \cdot \frac{1}{7}$ 2.10 $\frac{1}{\sqrt{2}} \log(\sqrt{2} + 1)$ 3.1 $E \Delta F = (E \setminus F) \cup (F \setminus E)$

3.2 c

3.3 $\frac{2^n}{n+1}$ 3.4 $D = \bigcup_{\varepsilon > 0} \bigcap_{n=1}^{\infty} \bigcup_{k=n}^{\infty} E_k(\varepsilon)$ 3.5 2^{14} 3.6 π 3.7 $x^2 + y = 2$ 3.8 $x + 2y - 3z = 3$

3.9 498

3.10

$$\binom{n}{m} \binom{m}{k} = \binom{n}{k} \binom{n-k}{\ell}$$

Note: k and ℓ can be interchanged on either side.

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