MCINTYRE MATHS · MATHEMATICS EXTENSION 2

Practice worksheet

Lesson 10 · Rays and regions

Name: _____ Date: _____

Rays

1. Sketch each locus and describe it in words.

(a) $\arg(z-2)=\frac{\pi}{2}$ (b) $\arg(z+1-i)=-\frac{\pi}{3}$

(c) $\arg(z-i)=\arg(z+i)$

Regions

2. Sketch each region.

(a) $|z|\le 2$ and $\operatorname{Re}(z)\ge 0$ (b) $2<|z-1|<3$

(c) $-\frac{\pi}{4}<\arg z\le\frac{\pi}{4}$

3. Sketch the region where $|z - i| \leq 2$ and $\text{Im}(z) \geq 0$, and find its area. (A segment of a circle of radius r with chord subtending angle α has area $\frac{1}{2}r^2(\alpha - \sin\alpha)$.)

Greatest and least values

4. $|z - 3 - 4i| = 2$. Find the greatest and least values of $|z|$.

5. The complex number z satisfies $|z - 4| = 2$. Find the greatest value of $\arg z$ and the corresponding z.

Arcs (extension)

6. Sketch $\arg\left(\dfrac{z-1}{z+1}\right) = \dfrac{\pi}{2}$. Describe the locus.

HSC-style

7. (a) Sketch the region where $|z-2| \leq 2$ and $0 \leq \arg z \leq \dfrac{\pi}{4}$. (b) Find the greatest value of $|z|$ in the region and the complex number where it occurs.

