

Course 2328 Complex Analysis I**S h e e t 1**

Due: Thursday, at the end of the lecture

Exercise 1

Find zw , z/w , z^{-100} , for

- (i) $z = 1 - i$, $w = 2i - 2$.
- (ii) $z = -i$, $w = 5i$.

Exercise 2

Find $\log z$, $\text{Log} z$ and \sqrt{z} for

- (i) $z = -2i$;
- (ii) $z = -1 + i$;
- (iii) $z = 2/(1 + \sqrt{3}i)$.

Exercise 3

Prove that

$$\text{Im}(iz) = \text{Re}z, \quad \text{Re}(iz) = -\text{Im}z, \quad \log \bar{z} = \overline{\log z}.$$

Exercise 4

- (i) Show that $\log(z_1 z_2) = \log z_1 + \log z_2$ as sets.
- (ii) Show that $\text{Log}(z_1 z_2) = \text{Log} z_1 + \text{Log} z_2$ provided $-\pi < \text{Arg} z_1 + \text{Arg} z_2 < \pi$.
- (iii) Give an example of z_1, z_2 with $\text{Log}(z_1 z_2) \neq \text{Log} z_1 + \text{Log} z_2$.

Exercise 5

Sketch the set of points give by the condition:

- (i) $1 < |z| < 3$;
- (ii) $1 < |z - 2i| < 2$;
- (iii) $\text{Re}((1 - i)\bar{z}) \geq -1$.