

SCHOOL OF MATHEMATICS AND PHYSICS

MATH3401

Tutorial Worksheet

Semester 1, 2024, Week 4

(1) Find all values of z such that

(a) $e^z = -2$;

(b) $e^z = 1 + \sqrt{3}$.

(2) Show that $\overline{\exp(iz)} = \exp(i\bar{z})$ if and only if $z = n\pi$, ($n = 0, \pm 1, \pm 2, \dots$).

(3) Show that

(a) $\text{Log}(1+i)^2 = 2\text{Log}(1+i)$;

(b) $\text{Log}(-1+i)^2 \neq 2\text{Log}(-1+i)$.

(4) Show that

(a) the set of values of $\log(i^{1/2})$ is

$$\left(n + \frac{1}{4}\right)\pi i \quad (n = 0, \pm 1, \pm 2, \dots);$$

(b) the set of values of $\log(i^2)$ is *not* the same as the set of values of $2\log i$.

(5) Use the definition

$$z^c = \exp(c \log z) \quad z \neq 0,$$

to show that $(-1 + \sqrt{3}i)^{3/2} = \pm 2\sqrt{2}$.