

MA4410 — Complex Arithmetic Review

Name:

1. Addition and Subtraction

Write answers in the form $x + iy$.

- (a) $(3 - 2i) + (5 + 4i)$
- (b) $(-1 + 6i) - (4 - 3i)$

Work / Answers

2. Multiplication

- (a) $(2 + 3i)(1 - 4i)$
- (b) $(\sqrt{3} + i)^2$

3. Polar Form and Integer Powers

- (a) Write $z = 1 - i$ in polar form $re^{i\theta}$,
 $\theta \in (-\pi, \pi]$.
- (b) Use polar form to compute z^4 .

4. Integer Powers (De Moivre)

Let $z = 2e^{i\pi/6}$.

- (a) Compute z^3 .
- (b) Express your answer in the form $x + iy$.

5. Integer Roots

- (a) Find all solutions of $w^3 = 8$.
- (b) Find all solutions of $w^4 = -1$.

6. Concept Check

How many distinct solutions does $w^n = z$ have when $z \neq 0$? Briefly justify.

Reminder. If $z = re^{i\theta}$, then

$$w_k = r^{1/n} e^{i(\theta+2\pi k)/n}, \quad k = 0, 1, \dots, n-1.$$