mmyau Solutions Manual

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Last updated: May 26, 2022

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Part I

Math on the Complex Plane

Solutions to Chapter 1

Solution 1.1.1 (a) I'm too lazy to compute these rn

Note that they do not equal.

Solution 1.1.2 Too lazy, but follows from commutation in reals.

Solution 1.1.3 (a) Let $z = a + ib$. Then, $z^* = a - ib$ and $(z^*)^* = a - (-ib) = a + ib = z$.

(b) (i) too lazy

Solution 1.2.1

$$e^{-i\theta} = \boxed{\cos\theta - i\sin\theta}$$

Thus, they are $\boxed{\text{conjugates}}$.

Solution 1.2.2 just do it

Solution 1.3.1

$$\mathrm{Re}(z) = \frac{z + z^*}{2} \qquad \mathrm{Im}(z) = \frac{z - z^*}{2}$$

Solution 1.3.2 (a) Let $z = a + ib$ where $a, b \in \mathbb{R}$. Substituting and cancelling,

$$z = z^*$$

$$a + ib = a - ib$$

$$ib = -ib$$

$$b = -b$$

$$b = 0$$

thus,

$$z = a \in \mathbb{R}$$

(b) We have

$$(z^*z)^* = (z^*)^*z^* = zz^* = z^*z$$

by commutivity. Thus, since z^*z is its on conjugate, it must be purely real.

Solution 1.3.3

$$e^{i\theta} = \cos\theta + i\sin\theta$$

Solution 1.3.4 (a) too lazy

Solution 1.3.5 (a) i don't want to

Solution 1.3.6 $\boxed{1, i, -1, -i}$

Solution 1.3.7 $\boxed{1, \frac{1}{2} + i\frac{\sqrt{3}}{2}, -\frac{1}{2} + i\frac{\sqrt{3}}{2}, -1, -\frac{1}{2} - i\frac{\sqrt{3}}{2}, \frac{1}{2} - i\frac{\sqrt{3}}{2}}$

Solutions to Chapter 2

Solution 2.1.1 literally just do what I said

Solution 2.1.2 again, just do what I said.

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