Complex Numbers - Practice Exam 4

Kyle Broder – ANU – MSI – 2017

Question 1. Write the solutions of $z^3 = \frac{1}{2}\sqrt{3} + \frac{1}{2}i$ in polar form.

Question 2. Determine the 5 roots of -2. Plot these roots on an Argand diagram.

Question 3. Determine the real part of $z = \sqrt{5 - 5i\sqrt{3}}$.

Question 4. (Dr. Lloyd Gunatilake).

a. Show that

$$\sin\vartheta + i\cos\vartheta = \cos\vartheta\left(\frac{\pi}{2} - \vartheta\right) + i\sin\left(\frac{\pi}{2} - \vartheta\right).$$

b. Hence, show that

$$\frac{1 + i\cot\vartheta}{1 - i\cot\vartheta} = \cos(\pi - 2\vartheta) + i\sin(\pi - 2\vartheta).$$