Assignment 1

MA06 Complex Analysis Deadline 11:59 AM, 20181211

1. Write the following expressions in the form $a + ib$, where $a, b \in \mathbf{R}$
   (a) $(1 + 2i) + (-3 + 7i)$
   (b) $(3 + 4i)^2$
   (c) $\frac{2+3i}{3-4i}$
   (d) $\frac{1-i}{1+i} - i + 2$
   (e) $\frac{1}{i+1}$
2. Let $z_1 = a_1 + ib_1, z_2 = a_2 + ib_2 \in \mathbf{C}$. Verify that
   (a) $\overline{z_1 + z_2} = \overline{z_1} + \overline{z_2}$
   (b) $\overline{z_1 z_2} = \overline{z_1}\ \overline{z_2}$
   (c) $|\overline{z}| = |z|$
3. Let $z, w \in \mathbf{C}$ and write them in polar form as $z = r(\cos\theta + i\sin\theta)$, $w = s(\cos\phi + i\sin\phi)$, where $r, s > 0$ and $\theta, \phi \in \mathbf{R}$.
   (a) Compute the product zw.
   (b) Using the trigonometric identities $\cos(\theta + \phi) = \cos\theta\cos\phi - \sin\theta\sin\phi$ and $\sin(\theta + \phi) = \sin\theta\cos\phi + \cos\theta\sin\phi$, show that $\arg(zw) = \arg z + \arg w$. (Notice that we here write $\arg z_1 = \arg z_2$ even if the principle argument of z_1 differs of z_2 by $2k\pi$ where k is a integer number.)

   Notice: Please write Your Name and Student ID when you submit.