Complex Numbers 1

1. Find the real and imaginary parts of:

   (a) $8+3i$ (b) $4-15i$ (c) $\cos\theta - i\sin\theta$

   (d) i^2 (e) $i(2-5i)$ (f) $(1+2i)(2-3i)$

2. If $z = 4+17i$, find (a) the real part of $3z$ and (b) the imaginary part of $-2z$.

3. If $z_1 = 9+2i$ and $z_2 = 4-7i$, find

   (a) $z_1 + z_2$ (b) $z_1 - z_2^2$

4. Calculate

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

5. Define $z = (5+7i)(5+bi)$.

   (a) If b and z are both real, find b.

   (b) If $\mathrm{Im}\{b\} = 4/5$, and z is pure imaginary, find $\mathrm{Re}\{b\}$.

6. Write down the complex conjugates of

   (a) $5+3i$ (b) $-(7-2i)$ (c) $-i$ (d) i^2 (e) $(2-3i)(i+7)$

7. Find the moduli of

   (a) $3-4i$ (b) $\sqrt{50}(1+i)$

8. For the two arbitrary complex numbers $z_1 = x_1 + iy_1$ and $z_2 = x_2 + iy_2$ show that

   (a) $(z_1+z_2)^* = z_1^* + z_2^*$ (b) $(z_1 z_2)^* = z_1^* z_2^*$

9. Calculate (a) $\dfrac{10}{4-2i}$ (b) $\dfrac{3-i}{4+3i}$ (c) $\dfrac{1}{i}$