1. Express each of the following complex numbers in the form $a + ib$ with a and b real:
   (a) $\dfrac{(8+2i)-(1-i)}{(2+i)^2}$
   (b) $(2+i)(-1-i)(3-2i)$
2. Let z be a complex number with $\mathrm{Im}(z) > 0$. Prove that $\mathrm{Im}(1/z) < 0$.
3. Let $z = 3 - 2i$. Plot the points z, $-z$, $\overline{z}$, $-\overline{z}$ and $1/z$ in the complex plane.
4. Sketch and describe the set of points in the complex plane that satisfies each of the following:
   (a) $|2z - i| = 4$
   (b) $|z| = \mathrm{Re}(z) + 2$
   (c) $\mathrm{Re}(z) \geq 4$
5. Prove that if $(\overline{z})^2 = z^2$ then z is either pure real or pure imaginary.
6. Let $z = 2 - i$ and $w = 1 + i$. Sketch each of the following vectors.
   (a) $z + w$
   (b) $z - w$
   (c) $2z - 3w$
7. Find $\arg(z)$ for each of the following where $0 \leq \arg(z) < 2\pi$
   (a) $z = -6 - 6i$
   (b) $z = \sqrt{3} - i$
8. Express each of the following in the form $a + bi$ where $a, b \in \mathbb{R}$:
   (a) $\dfrac{e^{3i} - e^{-3i}}{2i}$
   (b) $2e^{3+i\pi/6}$
9. Express each of the following complex numbers in exponential form $re^{i\theta}$ with $r > 0$ and $0 \leq \theta < 2\pi$:
   (a) $(\cos(2\pi/9) + i\sin(2\pi/9))^3$
   (b) $\dfrac{2+2i}{-\sqrt{3}+i}$
10. Show that $|e^z| \leq 1$ for all complex numbers z with $\mathrm{Re}(z) \leq 0$.