NOTE: Some of the exercises require that you sketch a set. When doing so, clearly indicate which points are in the set and which points are not. For example, boundary lines or curves which are not in the set should be indicated with dashes or dots.

1. Find the modulus of $\dfrac{(3-4i)^{10}}{(2+i)^8}$.
2. Find an identity which expresses $\cos(5x)$ in terms of $\cos(x)$ and $\sin(x)$.
3. Is it true that $\text{Arg}(z_1 z_2) = \text{Arg}(z_1)\text{Arg}(z_2)$ for every pair of nonzero complex numbers z_1 and z_2? If so, prove it; if not, give a counterexample.
4. Is it true that $\arg(z_1 z_2) = \arg(z_1)\arg(z_2)$ for every pair of nonzero complex numbers z_1 and z_2? If so, prove it; if not, give a counterexample.
5. Let $z = \cos(\theta) + i\sin(\theta)$. If n is an integer, evaluate both $z^n + \overline{z}^n$ and $z^n - \overline{z}^n$.
6. Find all values of
   (a) $(1+i)^{1/2}$
   (b) $(1+i\sqrt{3})^{3/4}$
7. Let n be a nonnegative integer. Determine (with justification) all values of n such that $z^n = 1$ possesses only real solutions.
8. Suppose w is located in the first quadrant and is a cube root of a complex number z. Can there exist a second cube root of z also located in the first quadrant? Justify your answer.
9. Sketch the graphs of the following equations in $\mathbb{C}$:
   (a) $|z+3i| = 2$
   (b) $|\text{Re}(1+i\overline{z})| = 3$
10. For each of the following, sketch the set S of points in the complex plane satisfying the inequality and state whether the set is (i) open, (ii) a domain, (iii) bounded, or (iv) connected:
    (a) $|\text{Arg}(z)| \leq 5\pi/6$
    (b) $2 < \text{Re}(z-1) < 4$
    (c) $\text{Re}(z^2) > 0$
    (d) $2 \leq |z-3+4i| \leq 5$
11. Let S be the set consisting of the complex plane with the circle $|z| = 3$ removed. Determine the boundary points of S. Is S connected?