(1) Evaluate the following expressions and write your answer in rectangular coordinates. For each, draw its position in the complex plane.

(a) \((3 + 2i) - (i + 7)\)
(b) \(\frac{1}{1+i}\)
(c) \(i^{441}\)
(d) \(2i \cdot (i^2 - i)\)

(2) Write each number in polar form and draw its position in the complex plane.

(a) \(5 - 5i\)
(b) \(-2i\)
(c) \(-2 + 2\sqrt{3}i\)

(3) Write each number in rectangular form.

(a) \(e^{2\pi i}\)
(b) \(10e^{\pi i + \frac{\pi}{4}}\)
(c) \(4e^{\frac{\pi}{2}}\)

(4) Suppose \(z = 2\sqrt{3} - 2i\) and \(w = -1 + i\). Find polar forms for \(zw\) and \(1/z\) by first putting \(z\) and \(w\) in polar form. (This should not require any rounding in your answer).

(5) Find the powers using De Moivre’s theorem. Write each number in rectangular form.

(a) \((2e^{i\pi/3})^5\)
(b) \((1 + i)^{20}\)

(6) Find triple-angle formulas by using De Moivre’s theorem to expand \((e^{i\theta})^3\). (In other words, give formulas for \(\cos(3\theta)\) and \(\sin(3\theta)\) in terms of \(\cos\theta\) and \(\sin\theta\).

(7) Find all solutions, and sketch the results in the complex plane.

(a) The eighth root of 1.
(b) The cube roots of 2i.
(c) The solutions to the equation \(z^4 = -16\).