(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) $\overline{2i \cdot (i^2 - i)}$

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

(a) $5 - 5i$

(b) $-2i$

(c) $-1 + 2\sqrt{2}i$

(3) Write each number in rectangular form.

(a) $e^{2\pi i}$

(b) $10\, e^{\pi+i}$

(c) $4\, e^{i\pi/3}$

(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.

(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 roots of 1.

(b) The cube roots of $2i$.

(c) The solutions to the equation $z^4 = -16$.