1. Compute the following:
(a) \((3+4i)+(2-5i)\)
(b) \((2+3i)(1-4i)\)

2. Find the real and imaginary parts of \(\frac{(1+2i)^2}{3-4i}\).

3. Find \(\text{Arg} \left( \frac{i}{-2-2i} \right) \).

4. Simplify \((-1+i)^{100}\) and express answer in rectangular coordinates.

5. Find \(\left( \frac{1}{2} + \frac{\sqrt{3}}{2}i \right)^{\frac{1}{2}}\) and express answer in rectangular coordinates.

6. Sketch \(\left\{ z \left| \frac{\text{Re} \left( \frac{1+i}{z} \right)}{z} > 0 \right. \right\}\).

7. If \(f(z) = \text{Re} \ z\), show that \(f\) does not have a derivative for any \(z \in \mathbb{C}\).

8. If \(f(x+iy) = e^{-y} \cos x + ie^{-y} \sin x\), does \(f\) have a derivative? Explain your answer and if \(f\) does have a derivative, compute it.

9. Show that the function \(e^y e^{ix}\) is nowhere analytic.

10. Let \(u(x,y) = x^3 - 3xy^2\).
   (a) Show that \(u\) is harmonic on the plane.
   (b) Find all analytic \(f(z)\) such that \(\text{Re} \ f(z) = u(x,y)\).

11. Find all the values of \(z\) such that \(e^z = -2i\).

12. Sketch the image of \(\left\{ z = x + i \left( \frac{\pi}{4} \right) \left| x \in \mathbb{R} \right. \right\}\) under the transformation \(w = e^z\).

13. Find all values of \(z\) such that \(\sin z = 2\).

14. Sketch the set of all \(z\) such that \(\text{Log}(z-1) \left/ \frac{z^2+1}{z} \right.\) is analytic.

15. Find the principle value of \(i^i\).