

1. Write in standard form:  $\frac{11-2i}{4-3i}$   
(standard form means  $a + b i$  with  $a$  &  $b$  real.)

2. Find all the cube roots of  $-1 + i$ .  
Write your answers in standard form.

3. Compute  $(-1 + i)^{20}$ . (answer in standard form)

4. Sketch the graph of  $z^{-1} = \bar{z}$

5. Sketch the graph of  $\operatorname{Re}((3 + i)z + 2 - 4i) > 0$ .

6. Prove: if  $|z| < 1$ , then  $\operatorname{Re}\left(\frac{1+z}{1-\bar{z}}\right) > 0$ .

7. Does the sequence  $\{z_n\}$ , where  $z_n = i^n$ , converge or diverge? If it converges, what is the limit? Give reasons for either answer.

8. Discuss the convergence or divergence of  $\sum_{n=1}^{\infty} \left(\frac{i}{n}\right)^n$ .

9. Do the same for  $\sum_{n=1}^{\infty} \frac{(2+i)^n}{(\sqrt{6})^n}$  .

10. Let  $w = e^z$ . shade the image, in the  $w$  - plane, of the region  $\{(x,y); 1 \leq x \leq 2, 0 \leq y \leq \pi\}$  .

under the map given by the function  $e^z$ .

11. Find all values of  $(-2)^i$ .

12. Evaluate the line integral  $\int_{\gamma} (z^4 - 3z^3) dz$ , where  $\gamma$  is any curve from 1 to  $1 + i$ .

13. Estimate  $\left| \int_{\gamma} \frac{dz}{z^4+16} \right|$ , where  $\gamma$  is the circle  $\gamma(t) = 3e^{it}$ ,  $0 \leq t \leq 2\pi$ .

14. Show that  $f(z) = z + \bar{z}$  is not analytic in  $D$  using the Cauchy - Riemann equations.

