

1. Find real and imaginary part the following

(a)  $(4 - 2i)^3$

(b)  $\frac{3-2i}{6-5i}$

(c)  $(3 + 2i)^2$

(d)  $5e^{i\pi/3}$

(e)  $(1 + i)^n, n = 1, 2, 3, \dots$

2. Find polar representation

(a)  $-7i$

(b)  $-6$

(c)  $-2 + 2i$

(d)  $1 + \sqrt{3}i$

(e)  $5$

3. Find complex square roots of each of the complex number in the previous exercise.

4. For a given function  $L(z)$  the *orbit of a point*  $z$  is the set  $\{z, L(z), L(L(z)), L(L(L(z))), \dots$

Let  $L_a(z) = az$ ; Sketch the orbit of 1 in the plane for each of the following values  $a$

(a)  $a = i/2$

(b)  $a = 2i$

(c)  $a = 1 + \sqrt{3}i$

(d)  $a = i$

(e)  $a = e^{2\pi i/9}$

5. Sketch a curve in the complex plane given by equation

(a)  $|z - 1 + i| = 3$

(b)  $|z - 1 + i| = |z + 2|$

(c)  $z^2 - \bar{z}^2 = 3i$

6. Solve

(a)  $z^5 = -i$

(b)  $z^4 + 2z^2 + 1 = -1$

7. **Extra Points Problem** Sketch a curve(s) which consists of square roots of all points that lie on a circle in the complex plane.

Hint: consider 4 cases: circle centered at the origin; origin lies inside the circle; origin lies on the circle; origin lies outside the circle.