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

- 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 exersice.
- 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) $z^2 - \overline{z}^2 = 3i$

6. Solve

(a)
$$z^5 = -i$$

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

7. Extra Points Problem 1. 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.

8. Extra Points Problem 2. Prove Lagrange's trigonometric identity

$$1 + \cos x + \cos(2x) + \dots + \cos(nx) = \frac{1}{2} + \frac{\sin((n+1/2)x)}{2\sin(x/2)}.$$