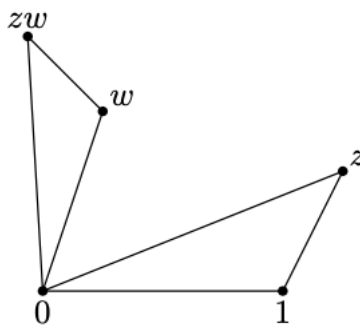


Please turn in this assignment on Gradescope.

**Problem 1 : (Objective A8)** One way to visualize multiplication of complex numbers is to work through the following exercise:

- a) Let  $z$  and  $w$  be two nonzero complex numbers. Let  $T_1$  be the triangle with vertices  $0$ ,  $1$ , and  $z$ , and  $T_2$  be the triangle with vertices  $0$ ,  $w$ , and  $zw$ . Show that  $T_1$  and  $T_2$  are similar triangles.



- b) What do these triangles have to do with multiplication? Explain in your own words.
- c) In the complex plane, draw the numbers  $1 + i$ ,  $(1 + i)^2$ ,  $(1 + i)^3$ , and  $(1 + i)^4$ , and the triangles  $T_1$  with vertices  $0$ ,  $1$ , and  $1 + i$ ,  $T_2$  with vertices  $0$ ,  $1 + i$ , and  $(1 + i)^2$ ,  $T_3$  with vertices  $0$ ,  $(1 + i)^2$ , and  $(1 + i)^3$ , and  $T_4$  with vertices  $0$ ,  $(1 + i)^3$ , and  $(1 + i)^4$ .

**Problem 2 : (Objective A9)** Sketch the contours given by the following curves. On your sketch, label the point(s) where each curve begins and ends, and use an arrow to show the direction in which the contour is traveled as  $t$  increases.

- a)  $\gamma(t) = e^{it}, t \in [0, \pi]$
- b)  $\gamma(t) = 2e^{-it}, t \in [0, 2\pi]$
- c)  $\gamma(t) = t^2 + it, t \in [-1, 1]$

Of these three contours, which one(s) are simple? Which one(s) are closed?

**Problem 3 : (Objective A9)** Sketch the following sets in the plane:

- a)  $\{z \in \mathbb{C} : 1 < |z| \leq 2\}$
- b)  $\{z \in \mathbb{C} : |z + 1| = |z - 1|\}$