Name: _____

Show complete work—that is, all the steps needed to completely justify your answer. Simplify your answers as much as possible. You may refer to theorems that we proved in class.

(1) (a) Define the conjugate $\bar{z}$ of the complex number $z = x + iy$.

    (b) Show that z is purely imaginary (i.e, has real part 0) if and only if $z = -\bar{z}$.

(2) (a) Define the polar coordinates of the complex number $z = x + iy$.

(b) Find all solutions to $z^4 = -16$.

(3) (a) Define $\lim_{z \to z_0} f(z) = w_0$.

(b) Prove that $\lim_{z \to z_0} f(z) = 0$ if and only if $\lim_{z \to z_0} |f(z)| = 0$.

You will be allowed to (once) revise and resubmit Problems 2(b) and 3(b) by the beginning of class on 2/26/25. For the revision, you are not allowed to communicate with your class mates, and you may use neither internet nor AI sources. I will reserve the right to ask you about your work if I suspect that you violated these rules.