PROBLEM:

Simplify the following complex-valued expressions. Reduce the answers to a simple numerical form.

(a) For $V = (-1 - j)e^{j7}$, determine the magnitude squared of V.

(b) Evaluate $U = \dfrac{j}{-c - jc}$, and express the answer in polar form. Assume that c is a constant. In addition, plot the vector U.

(c) For $W = j^3(-1 - j)$, express W in polar form. In addition, plot j^3 and W as vectors.

(d) A signal $x(t) = \Re e\{Ze^{j\omega_0 t}\}$ is also the same as $x(t) = 2\cos(200\pi t - 3\pi/4)$. Determine the value of Z in *rectangular form* and select the correct answer below. Show your work.

(A) $-2 - 2j$

(B) $-2 - 2j$

(C) $-\sqrt{2} + j\sqrt{2}$

(D) $-\sqrt{2} - j\sqrt{2}$

(E) $-1 + j$

(F) $-1 - j$