

**PROBLEM:**

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

(a) For  $V = -2j e^{j2\pi/3}$ , determine the magnitude squared of  $V$ . In addition, plot the vector  $V$ .

(b) Evaluate  $U = \frac{c e^{j2\pi/3}}{-1 - j\sqrt{3}}$ , and express the answer in polar form. Assume that  $c$  is a positive real number. In addition, plot the vector  $U$ .

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

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

(A)  $-2 + j2\sqrt{3}$

(B)  $-2 - j2\sqrt{3}$

(C)  $-\sqrt{3} + j$

(D)  $-\sqrt{3} - j$

(E)  $-1 + j\sqrt{3}$

(F)  $-1 - j\sqrt{3}$