

**ECE 3337 Summer-3 Homework 2, Due Tues 6/14**

**Problem 1.** Graph the following regions in the complex plane (plot a few points where the relation holds with equality, then mark region where the inequality/equality holds).

a)  $|z + 2 - i| \geq 1.0$       b)  $\frac{|z + 2|}{|z - i2|} = 1.0$       c)  $|z + 1 - j| \geq |1 - j|$       d)  $\operatorname{Re}\left\{\frac{iz^2}{2 - i}\right\} \leq 2.0$

**Problem 2.** Showing all work, find all values of  $z$  for which

(a)  $z = \sqrt{1 - i}$  ;

(b)  $z = \sqrt[3]{1 + i}$

(c)  $z = \sqrt[3]{-1 + j}$

**Problem 3.**

Where  $f(z) = z e^{-z}$  and  $z = x + jy$ , find **real** functions  $u(x, y)$  and  $v(x, y)$  such that  $f(x + jy) = u(x, y) + jv(x, y)$ .

**Problem 4.** Find all solutions  $z$  to the equation  $\sin(z) = 3 + j0$  .

**Problem 5.** (If you understand the complex  $\exp()$  function, you can do this problem quickly without a calculator).

a) Where  $\theta_n = \frac{n\pi}{4}$ , plot the 8 points  $z_n = 2.0 \exp(-j\theta_n)$  for  $n = 0, 1, 2, 3, 4, 5, 6, 7$  on a complex graph, label each point with the corresponding  $z_n$  next to the point.

b) Where  $\theta_n = \frac{n\pi}{4}$ , plot the 8 points  $z_n = (1.0 - j) + 2.0 \exp(+j\theta_n)$  for  $n = 0, 1, 2, 3, 4, 5, 6, 7$  on a complex graph, label each point with the corresponding  $z_n$  next to the point.

**Problem 6.** Compute  $\int_c \{(j2)z^2 - 3z + 1 - j\} dz$ , where  $c$  is the straightline path from  $z = 1 - j$  to  $z = -1 - j2$ , by parameterizing the integral in terms of real variable  $t$ .

**Problem 7.** Evaluate the complex integral  $\int_{0+j2}^{2+j2} \exp[(2 + j)z] dz$  along the straightline path between the two points by parameterizing the complex integral in terms of  $t$  .