

EE3210 Signals and Systems

Tutorial 1

Problem 1: Using Euler's formula, show that

$$\cos \theta = \frac{e^{j\theta} + e^{-j\theta}}{2}$$

and

$$\sin \theta = \frac{e^{j\theta} - e^{-j\theta}}{2j}.$$

Problem 2: Given

$$z = r(\cos \theta + j \sin \theta),$$

show that

$$z^n = r^n [\cos(n\theta) + j \sin(n\theta)].$$

Problem 3: A number x is said to be an n th root of a complex number y if $x^n = y$. Let $y = re^{j\theta}$. Show that

$$x = r^{\frac{1}{n}} e^{j \frac{\theta + 2\pi k}{n}}$$

where $k = 0, 1, \dots, n - 1$.