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EE214000 Electromagnetics, Fall 2020

Your name: _____ ID: _____ Sep. 16, 2020

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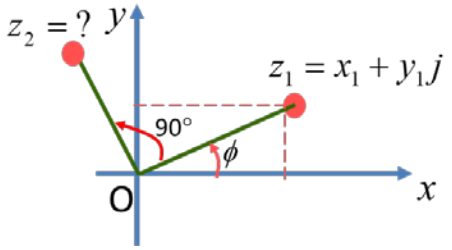
Quiz #2, Open books, notes (39 points), due 10 am, Wednesday, Sep. 16, 2020
(email solutions to 劉峰麒 <alex851225@gmail.com>)

1. What is the phase angle of the imaginary unit $\sqrt{-1}$. (2 points)

2. A and B are real numbers. What is the complex conjugate of $z = \frac{1 + Ae^{j\phi}}{A - jB}$. (2 points)

3. If you rotate the complex number $z_1 = x_1 + jy_1$ on the polar-coordinate plane by +90°, what is the resulting complex number z_2? (5 points)



4. Express z = 4+3j in the polar form (3 points), and mark it (2 points) and its complex conjugate (2 points) on the polar coordinate system.

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5. Calculate the division $z_3 = z_1 / z_2$ and express the result in polar form, z1 = 1 + j and z2 = 4+ 3j. (5 points)

6. For a harmonic wave expressed as $A(z,t) = A_0 \cos(\omega t - kz + \phi)$, what is the phasor expression of this wave? (3 points)

7. For a time-harmonic wave function described by *A*, what is the phasor expression of the wave equation $\nabla^2 A - \frac{1}{c^2}.\frac{\partial^2 A}{\partial t^2} = 0$, where *c* is a constant? (5 points)

8. For the RC circuit shown below, if the driving voltage is a sinusoidal input with a frequency of 60 Hz, given by

$$\tilde{v}_s(t) = 100\cos(2\pi \times 60t + \pi/6) \text{ volts}$$

what is the current in the circuit? (10 points)