

Quiz 2, ECED 3300

Instructor: Sergey A. Ponomarenko.

Place, Date and Time: B311; Tuesday, November 14, 2017, 8:35 to 9:25 am.

Closed Books: Formula sheets are provided; no calculators are allowed.

Hint: Make sure to justify all your answers to get full credit.

Problem 1 (10pts)

Given the vector potential,

$$\mathbf{A} = \frac{y\mathbf{a}_x - x\mathbf{a}_y}{1 + z^2}, \text{ Wb/m,}$$

in a region of space, determine the magnetic flux density there.

Problem 2 (20pts)

Determine the magnetic field at the center of a circular loop of radius b carrying the filamentary current I .

Problem 3 (20 pts)

Given the current density,

$$\mathbf{J} = \frac{J_0 r}{R} e^{-r/R} \mathbf{a}_\theta,$$

where J_0 and R are given constants, determine

- a) the time rate of change of the volume charge density everywhere,
- b) the total current through a sphere of radius R , centered at the origin.