Q(1): (Check of Note 381(6))

Using:

$$\underline{A} = -\frac{e_1 e_2}{4\pi\epsilon_0 c r^2}\,\underline{r} \quad -(1)$$

and

$$\underline{\omega} = \frac{\underline{r}}{r^2} \quad -(2)$$

it follows that:

$$\underline{\omega} \times \underline{A} = \underline{0} \quad -(3)$$

so

$$\omega_Y A_Z - \omega_Z A_Y = 0 \quad -(4)$$

$$\omega_Z A_X - \omega_X A_Z = 0 \quad -(5)$$

$$\omega_X A_Y - \omega_Y A_X = 0 \quad -(6)$$

From eq. (1):

$$A_X = -\frac{e_1 e_2}{4\pi\epsilon_0 c}\,\frac{X}{(X^2+Y^2+Z^2)} \quad -(7)$$

$$A_Y = -\frac{e_1 e_2}{4\pi\epsilon_0 c}\,\frac{Y}{(X^2+Y^2+Z^2)} \quad -(8)$$

so:

$$\frac{\partial A_X}{\partial Y} = \frac{e_1 e_2}{4\pi\epsilon_0 c}\,\frac{XY}{(X^2+Y^2+Z^2)^2} \quad -(9)$$

$$\frac{\partial A_Y}{\partial X} = \frac{e_1 e_2}{4\pi\epsilon_0 c}\,\frac{YX}{(X^2+Y^2+Z^2)^2} \quad -(10)$$

so

$$\frac{\partial A_X}{\partial Y} = \frac{\partial A_Y}{\partial X} \quad -(11)$$

et cyclicum

The antisymmetry laws are obeyed, Q.E.D, i.e

$$\frac{\partial A_X}{\partial Y} - \frac{\partial A_Y}{\partial X} = \omega_X A_Y - \omega_Y A_X = 0 \quad -(12)$$

et cyclicum

The fundamental method being used is:

$$\underline{E} = -\underline{\nabla}\phi + \underline{\omega}\phi = -\frac{e_1 e_2}{4\pi\epsilon_0 r^3}\underline{r} \quad -(13)$$

and

$$-\underline{\nabla}\phi = \underline{\omega}\phi \quad -(14)$$

The antisymmetry law is:

$$-\underline{\nabla}\phi + \underline{\omega}\phi = -\frac{\partial \underline{A}}{\partial t} - \omega_0 \underline{A}. \quad -(15)$$

In electrostatics:

$$\frac{\partial \underline{A}}{\partial t} = \underline{0} \quad -(16)$$

So

$$\underline{E} = -2\underline{\nabla}\phi = 2\underline{\omega}\phi = -\omega_0 \underline{A} \quad -(17)$$

Then the results of Notes 381(4) and 381(5) follow.
This same method is applied to precessing orbits in the next notes.