6.4 $\nabla \times E = -\partial B/\partial t$

$$\nabla \times E = Re\left[e^{-i\omega t}\,\nabla \times \tilde{E}\, e^{ik\cdot r}\right] = Re\left[e^{-i\omega t}\left(ik_y \tilde{E}_z e^{ik\cdot r} - \tilde{E}_y (ik_z) e^{ik\cdot r}\right)\hat{x}\right]$$

$$-\partial B/\partial t = -Re\left[\tilde{B}_x(-i\omega)e^{-i\omega t} e^{ik\cdot r}\right]\hat{x}$$

$$\nabla \times E = -\partial B/\partial t = Re\left[\cancel{e^{-i\omega t}}\left(\cancel{i}k_y \tilde{E}_z \cancel{e^{ik\cdot r}} - \tilde{E}_y(\cancel{i}k_z)\cancel{e^{ik\cdot r}}\right)\hat{x}\right] = \cancel{-}Re\left[\tilde{B}_x(\cancel{-i}\omega)\cancel{e^{-i\omega t}}\,\cancel{e^{ik\cdot r}}\,\hat{x}\right]$$

$$= Re\left[(\tilde{E}_z k_y - \tilde{E}_y k_z)\hat{x} = \tilde{B}_x(\omega)\hat{x}\right]$$

$$= Re\left[\frac{\hat{k}\times\tilde{E}}{c} = \tilde{B}\right]$$

$Re\left[\frac{\hat{k}\times\tilde{E}}{c} = \tilde{B}\right]$ and $Im\left[\frac{\hat{k}\times\tilde{E}}{c} = \tilde{B}\right]$ are in phase

so Re and Im are dropped

$B = \frac{1}{c}\hat{k}\times E$ and $\tilde{B} = \frac{1}{c}\hat{k}\times\tilde{E}$