Now we will separate \vec{E} and \vec{B} :

• Start with equation (1):

$$\frac{\partial E}{\partial x} = -\frac{\partial B}{\partial t}$$

• Take $\partial/\partial x$ of both sides

$$\frac{\partial}{\partial x}\frac{\partial E}{\partial x} = -\frac{\partial}{\partial x}\left(\frac{\partial B}{\partial t}\right)$$

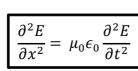
• Switch derivative order: $\frac{\partial^2 E}{\partial \theta} = \frac{\partial^2 E}{\partial \theta}$

$$\frac{\partial^2 E}{\partial x^2} = -\frac{\partial}{\partial t} \left(\frac{\partial B}{\partial x} \right)$$
Substitute for $\partial B / \partial x$

from equation (2): $\frac{\partial^2 E}{\partial x^2} = -\frac{\partial}{\partial x} \left(-\mu_0 \epsilon_0 \frac{\partial E}{\partial x} \right)$

$$\frac{\partial^2 E}{\partial x^2} = -\frac{\partial}{\partial t} \left(-\mu_0 \epsilon_0 \frac{\partial E}{\partial t} \right)$$

• Simplify:



Now you try it:

Start with equation (2):
$$\frac{\partial B}{\partial x} = -\mu_0 \epsilon_0 \frac{\partial A}{\partial x}$$

• Take $\partial/\partial x$ of both sides

• Switch derivative order:

Substitute for $\partial E/\partial x$ from equation (1):

• Simplify: