b) from a) $\Rightarrow$ $T^2(x)\sin\theta\cos\theta = T_0 \cdot wx$

$$T^2(x)\frac{\tan\theta}{1+\tan^2\theta} = T_0 w_0 x$$

$$T^2(x) = T_0 wx\left(\tan\theta + \frac{1}{\tan\theta}\right)$$

$$\tan\theta = \frac{w}{T_0}x.$$

$$\therefore T^2(x) = T_0 Wx\left(\frac{w}{T_0}x + \frac{T_0}{Wx}\right) = T_0^2 + w^2x^2$$

$$T(x) = T_0\sqrt{1+\left(\frac{Wx}{T_0}\right)^2}$$

3. $\vec{\nabla}\times\vec{B} = \frac{1}{c^2}\frac{\partial\vec{E}}{\partial t}$ ①

$\vec{\nabla}\times\vec{E} = -\frac{\partial B}{\partial t}$ ② $\Rightarrow \frac{\partial}{\partial t}(\vec{\nabla}\times\vec{E}) = -\frac{1}{c}\frac{\partial^2 B}{\partial t^2}$

$\vec{\nabla}\cdot\vec{E} = 0$ ③

$\vec{\nabla}\cdot\vec{B} = 0$ ④

$$\vec{\nabla}\times(\vec{\nabla}\times\vec{B}) = \frac{1}{c}\frac{\partial}{\partial t}(\vec{\nabla}\times\vec{E}) = -\frac{1}{c^2}\frac{\partial^2\vec{B}}{\partial t^2}$$

$$\left.\begin{array}{l}\vec{\nabla}\times(\vec{\nabla}\times\vec{B}) = \vec{\nabla}\cdot(\vec{\nabla}\cdot\vec{B}) - \Delta\vec{B} \\ \nabla\cdot B = 0\end{array}\right\} \Rightarrow \vec{\nabla}\times\vec{\nabla}\times\vec{B} = -\Delta\vec{B}$$

$\therefore \Delta\vec{B} = \frac{1}{c^2}\frac{\partial^2\vec{B}}{\partial t^2}.$ 4-dim. wave equation.

Similarly $\Delta\vec{E} = \frac{1}{c^2}\frac{\partial^2\vec{E}}{\partial t^2}.$

$$\Delta = \left(\frac{\partial}{\partial x^2} + \frac{\partial}{\partial y^2} + \frac{\partial}{\partial z^2}\right).$$