Waves u(x) u(x+h) u(x+2h) $= f_{x+2h} - f_{x}$

 $= k \left[u\left(x+2h,t\right) - u\left(x+h,t\right) \right]$ $- k \left[u\left(x+h,t\right) - u\left(x,t\right) \right]$

$$\frac{\partial^{2}}{\partial t^{2}} u(x+h,t) = \frac{k}{m} \left[u(x+2h,t) - u(x+h,t) - u(x+h,t) + u(x,t) \right]$$

$$+ wasses \qquad L = Nh \qquad K = k/N \quad M = Nm$$

$$\frac{\partial^{2}}{\partial t^{2}} u(x+h,t) = \frac{KL^{2}}{M} \frac{u(x+2h,t) - 2u(x+h,t) + u(x,t)}{h^{2}}$$

Fraction = $ma(t) = m \frac{\partial^2}{\partial t^2} u(x+h,t)$

$$\frac{\partial^2 u(x+h,t)}{\partial u(x+h,t)} = \frac{KL^2}{u(x+h,t)} \frac{u(x+h,t) - 2u(x+h,t) + u(x,t)}{12}$$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

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$$=\frac{h \Rightarrow 0}{\lim_{h \Rightarrow 0} \frac{f(x+2h) - 2f(x+h) + f(x)}{12}}$$

$$=\frac{\lim_{h\to 0} \frac{f(x+2h)-2f(x+h)/(00)}{h^2}}{h^2}$$

$$N\to \infty$$

$$\frac{h \rightarrow 0}{h \rightarrow 0} \qquad \qquad h^2$$

$$\frac{h \rightarrow 0}{h \rightarrow 0} \qquad \qquad h^2$$

$$\frac{N \to \infty}{2^2 u(x,t)} = \frac{KL^2}{M}$$

$$f''(x) = \lim_{h \to 0} \frac{f'(x+h) - f(x)}{h}$$

$$= \lim_{h \to 0} \frac{f(x+h) - 2f(x+h) + f(x)}{h}$$

$$= \lim_{h \to 0} \frac{f(x+h) - 2f(x+h) + f(x)}{h}$$

$$\frac{\text{Solution}}{\Psi(\mathcal{R},t)} = \frac{\chi(\mathcal{R}) T(t)}{\chi(\mathcal{R},t)}$$

$$\frac{1}{2} \times (2) dT(t)$$

$$\frac{\partial \Psi}{\partial t} = \chi(x) \frac{dT(t)}{dt}$$

$$\frac{\partial^2 \Psi}{\partial t} = \chi(x) \frac{d^2T(t)}{dt}$$

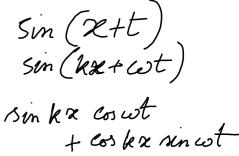
$$\frac{3^2 \Psi}{3t^2} = \chi(x) \frac{d^2 \tau(t)}{dt^2}$$

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$$\frac{\partial^2 \psi}{\partial t^2} = \tau(t) \frac{d^2 \chi(z)}{dt^2}$$

$$= \tau(t) \frac{d^2 \chi(z)}{dz^2}$$

$$\frac{1}{2} = \chi(x) \frac{d^{2} \gamma(t)}{dt^{2}}$$



kx+wt

Y(2+t)

$$\frac{1}{T(t)} \frac{d^2T(t)}{dt^2} = c^2 \frac{1}{X(x)} \frac{d^2X(x)}{dx^2} = constant$$

$$= -\omega^2$$

Separetion of variables
$$\frac{d^{2}\chi(x)}{dt^{2}} = -\frac{\omega^{2}}{\sigma^{2}}\chi(x)$$

$$\frac{d^{2}T(t)}{dt^{2}} + \omega^{2}T(t) = 0$$

 $\chi(x) \frac{d^2 \tau(t)}{dt^2} = c^2 \tau(t) \frac{d^2 \chi(x)}{dx^2}$

$$\frac{\frac{d^{2}\chi(x)}{dx^{2}} = -\frac{\omega^{2}}{c^{2}}\chi(x)}{\frac{d^{2}\chi(x)}{dx^{2}} + (\frac{\omega^{2}}{c^{2}})\chi(x) = 0}$$

$$\frac{d^{2}\chi(x)}{dx^{2}} + (\frac{\omega^{2}}{c^{2}})\chi(x) = 0$$