Let us check WHETHER and, if so, under WHAT CONDITIONS, this is a solution to the DNA wave equation (4).

We start by computing the necessary partial derivatives of the proposed solution $y(x,t)$:

- $y(x,t) = A\cos(kx)\cos(\omega t)$
- $\frac{\partial^2 y}{\partial t^2}(x,t) = -\omega^2 A\cos(kx)\cos(\omega t) = \underline{-\omega^2 y(x,t)}$
- $\frac{\partial^2 y}{\partial x^2}(x,t) = -k^2 A\cos(kx)\cos(\omega t) = \underline{-k^2 y(x,t)}$
- $\frac{\partial^4 y}{\partial x^4}(x,t) = (-k^2)(-k^2)A\cos(kx)\cos(\omega t)$

$$= +k^4 A\cos(kx)\cos(\omega t) = \underline{k^4 y(x,t)}$$

Substituting everything into the wave equation (4), we get:

$$\frac{1}{c^2}\left[-\omega^2 y(x,t)\right] - \left[-k^2 y(x,t)\right] + a^2\left[k^4 y(x,t)\right] = 0$$

$$\underline{\left[-\frac{\omega^2}{c^2} + k^2 + a^2 k^4\right] y(x,t) = 0}$$