Consider the ODE

$$y^{(4)} + \beta y = g(y) \qquad -\infty < x < \infty$$

with the boundary conditions

$$y(x) \text{ bounded as } |x| \to \infty$$

Assume that β is real and positive and that $g(x)$ behaves in such a way so that a bounded solution is possible.

(a) Compute the Fourier transform of the solution

(b) Use the convolution theorem to solve the ODE and express the solution as an integral involving $g(x)$