Question 29585

Let us take the Fourier transform from both sides of equation.
To do this, one should use the property of Fourier transform $\widehat{(y^n)} = (ik)^n \hat{y}(k)$, where y^n denotes n-th derivative.

For equation $y''(x) - a^2 y(x) = f(x)$, Fourier transform will be $(ik)^2 \hat{y}(k) - a^2 \hat{y}(k) = \hat{f}(k)$.

Solving this equation for $\hat{y}(k)$ gives $\hat{y}(k) = \dfrac{-\hat{f}(k)}{k^2 + a^2}$.