

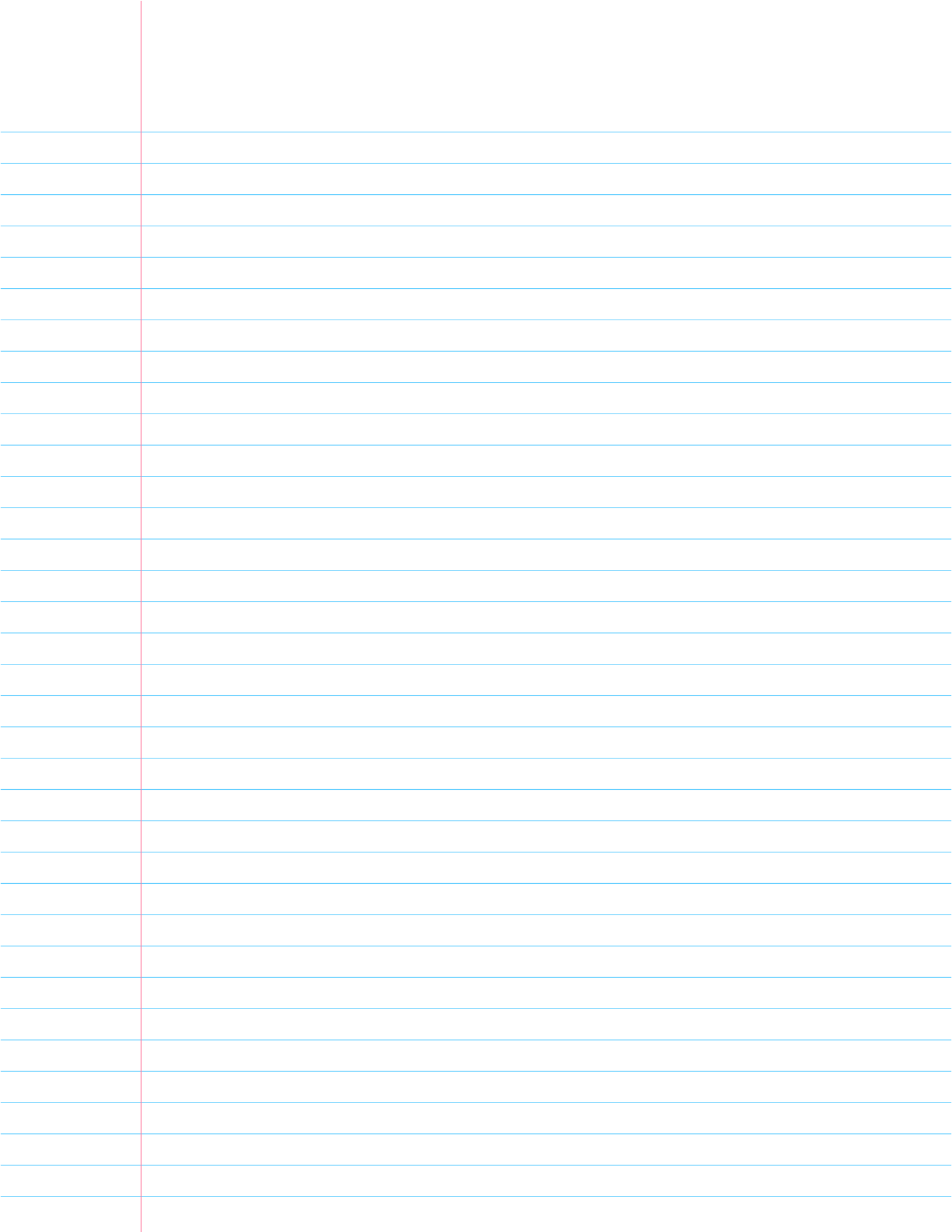
## 4.4 - Undetermined Coefficients–Superposition Approach

The techniques in this lesson apply to nonhomogeneous DEs of the form  $a_n y^{(n)} + a_{n-1} y^{(n-1)} + \dots + a_1 y' + a_0 y = g(x)$  whose input functions (that is,  $g(x)$ ) are constants, polynomials, exponentials, sines and cosines, and sums and products of these.

From 4.1: Consider  $y'' - 6y' + 5y = -9e^{2x} + 5x^2 + 3x - 16$

Solve the given differential equation by undetermined coefficients.

**Ex:**  $y'' - 8y' + 20y = 100x^2 - 26xe^x$



Ex:  $y'' - 16y = 2e^{4x}$

Ex:  $4y'' - 4y' - 3y = \cos 2x$

$y_p$  forms, assuming no redundancy

$g(x)$	$y_p$
$3x^2 + 2$	
$7e^{4x}$	
$8x^2 e^{2x}$	
$3 \sin 2x$	
$x \cos 3x$	