

# Solving nonhomogeneous linear DEs via undetermined coefficients <sup>↕</sup>

Recall that the general solution of the differential equation

$$ay'' + by' + cy = f(x),$$

with  $f(x) \neq 0$  and constants  $a, b, c$ , is of the form

$$y = y_h + y_p,$$

where  $y_h$  is the general solution of the homogeneous DE  $ay'' + by' + cy = 0$ , and  $y_p$  is a particular solution of the nonhomogeneous DE above. We learned how to find  $y_h$  in the previous module.

Here, we learn how to find  $y_p$  in four special cases. In particular, when  $f(x)$  is:

1. a polynomial of degree  $k$ ;
2. a sum of  $\sin(x)$  and/or  $\cos(x)$ ;
3. of the form  $x^k e^{mx}$ ; or
4. a combination of the above terms.

## Discussion, comments, and examples:



Math45-Module-13-Video-01

## WeBWorK module 13 exercises:

- Problems 1, 2, 3, 4

## Relevant Wikipedia articles:

- [Method of undetermined coefficients](https://en.wikipedia.org/wiki/Method_of_undetermined_coefficients) <sup>↗</sup> [https://en.wikipedia.org/wiki/Method\\_of\\_undetermined\\_coefficients](https://en.wikipedia.org/wiki/Method_of_undetermined_coefficients)