Nonhomogeneous Linear ODEs with Constant Coefficients
and the Method of Undetermined Coefficients

Idea:
1.
2.
3.

The Method of Undetermined Coefficients:
Consider the ODE $ay'' + by' + cy = f(t)$.

1. If $f(t) = a$ degree $n$ polynomial, then
   \[ y_p(t) = \ldots \]

2. If $f(t) = ke^{rt}$, then
   \[ y_p(t) = \ldots \]

3. If $f(t) = k_1e^{\alpha t} \cos(\beta t) + k_2e^{\alpha t} \sin(\beta t)$, then
   \[ y_p(t) = \ldots \]
Ex 1: State the form of a particular solution to the ODE $y'' - 2y' - 3y = f(t)$, where
(a) $f(t) = 5t + 2.$
(b) $f(t) = t^3$
(c) $f(t) = e^{4t}$
(d) $f(t) = e^{3t}$
(e) $f(t) = \cos t.$

Ex 2: Use your guesses from Ex 1 to find a particular solution to the ODE $y'' - 2y' - 3y = f(t)$, where
(a) $f(t) = 5t + 2.$
(c) \( f(t) = e^{4t} \)

(d) \( f(t) = e^{3t} \)
(e) \( f(t) = \cos t. \)