

1. By using the undetermined coefficients method, to find a particular solution of the linear nonhomogeneous equation $y'' - 2y' - 3y = \cos(2t)$, which of the following y_p we should try? (Circle only one)

(a) $y_p = At^2 + Bt + C$

(b) $y_p = c_1 e^{3t} + c_2 e^{-t}$

(c) $y_p = A \sin(2t) + B \cos(2t)$

(d) none of above

2. Solve the initial value problem $y'' - 2y' + 2y = 0$ with $y(0) = 2$ and $y'(0) = 2$. (Circle only one)

(a) $y = 2e^t \sin(t) + 2e^t \cos(t)$

(b) $y = e^t \sin(t)$

(c) $y = e^t \sin(t) - e^t \cos(t)$

(d) $y = 2e^t \cos(t)$

3. Determine the linear dependence of the following functions: $f_1(t) = t+1$, $f_2(t) = 2t-1$, and $f_3(t) = 3t^2+2$.

Let $k_1 f_1 + k_2 f_2 + k_3 f_3 = 0$ for all t .

Then $k_1(t+1) + k_2(2t-1) + k_3(3t^2+2) = 0$.

$\Rightarrow 3k_3 t^2 + (k_1 + 2k_2)t + (k_1 - k_2 + 2k_3) = 0$ for all t .

$\Rightarrow \begin{cases} 3k_3 = 0 \\ k_1 + 2k_2 = 0 \\ k_1 - k_2 + 2k_3 = 0 \end{cases} \Rightarrow k_1 = k_2 = k_3 = 0$.

So, f_1 , f_2 , and f_3 are linearly independent.