# Section 31.7/8: cont'd

Friday, February 23, 2018 10:22 AM

Solve: $y''' - y' = 0$

aux eqn: $m^3 - m = 0$

$m(m^2-1) = 0$

$m(m+1)(m-1) = 0$

$m = 0, \pm 1$

$y = C_1 e^{0x} + C_2 e^{1x} + C_3 e^{-1x}$

$$y = C_1 + C_2 e^{x} + C_3 e^{-x}$$

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Solve: $y''' + y' = 0$

aux eqn: $m^3 + m = 0$

$m(m^2+1) = 0$

$m = 0$ or $m^2 + 1 = 0$

$m^2 = -1$

$m = \pm\sqrt{-1} = \pm i$

$m = 0, i, -i$

$a \pm bi$ where $a = 0$ and $b = 1$

$y = C_1 e^{0x} + e^{0x}(C_2 \cos x + C_3 \sin x)$

$y = c_1 e^{0x} (c_2 \cos x + c_3 \sin x)$

$= c_1 + c_2 \cos x + c_3 \sin x$

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Solve: $y'''' - y = 0$

aux eqn: $m^4 - 1 = 0$

$(m^2 - 1)(m^2 + 1) = 0$

$m = \pm 1$ $\quad$ $m = \pm i$

$m = 1, -1, i, -i$

$y = c_1 e^x + c_2 e^{-x} + e^{0x} (c_3 \cos x + c_4 \sin x)$

$= c_1 e^x + c_2 e^{-x} + c_3 \cos x + c_4 \sin x$