Indian Institute of Technology Delhi - Abu Dhabi

AMTL101

Tutorial Sheet 12: Systems of ODEs

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(1) Solve the following systems of ODEs.
   (a) $x_1' = x_1 + 2x_2,\ x_2' = \frac{1}{2}x_1 + x_2$
   (b) $x_1' = -8x_1 - 2x_2,\ x_2' = 2x_1 - 4x_2$
   (c) $x_1' = x_2,\ x_2' = -x_1 + x_3,\ x_3' = -x_2$

(2) Solve the following IVPs.
   (a) $x_1' = 2x_1 + 2x_2,\ x_2' = 5x_1 - x_2,\ x_1(0) = 0,\ x_2(0) = 7$
   (b) $x_1' = -14x_1 + 10x_2,\ x_2' = -5x_1 + x_2,\ x_1(0) = -1,\ x_2(0) = 1$

(3) Solve the following systems of ODEs.
   (a) $x_1' = x_2 + e^{3t},\ x_2' = x_1 - 3e^{3t}$
   (b) $x_1' = -x_1 + x_2 + 10\cos t,\ x_2' = -3x_1 - x_2 - 10\sin t$
   (c) $x_1' = x_1 + 4x_2 - 2\cos t,\ x_2' = x_1 + x_2 - \cos t + \sin t$