Wolkite University
Mathematics Department
Applied Mathematics III
Worksheet 3

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1. Solving the Following First Order Differential Equations using Laplace Transform

   a) $y' + 2y = e^t, \quad y(0) = 0$

   b) $y' - y = t, \quad y(0) = 1$

   c) $y' + 3y = \sin(t), \quad y(0) = 0$

   d) $y' + y = e^{-t}, \quad y(0) = 2$

   e) $y' + 4y = e^{2t}, \quad y(0) = 0$

   f) $y' + 2y = e^{-t}, \quad y(0) = 1$

   g) $y' + 3y = e^{3t}, \quad y(0) = -1$

   h) $y' - y = e^{4t}, \quad y(0) = 2$

2. Solving the Following Second Order Differential Equations using Laplace Transfrom

   a) $y'' - 4y' + 4y = 0, \quad y(0) = 1, \quad y'(0) = 0$

   b) $y'' + y = \cos(t), \quad y(0) = 0, \quad y'(0) = 1$

   c) $y'' - 2y' + y = te^t, \quad y(0) = 0, \quad y'(0) = 0$

   d) $y'' + 3y' + 2y = 0, \quad y(0) = 1, \quad y'(0) = -1$

   e) $y'' - 3y' + 2y = 0, \quad y(0) = 2, \quad y'(0) = 1$

   f) $y'' + y = 0, \quad y(0) = 1, \quad y'(0) = 0$

   g) $y'' + 2y' + y = t^2, \quad y(0) = 0, \quad y'(0) = 1$

   h) $y'' - y = \sin(t), \quad y(0) = 0, \quad y'(0) = 1$

3. Solve the following differential equations using the Laplace transform method

   a) $xy'' + (2x + 3)y' + (x + 3)y = 3e^{-x}, \quad y(0) = 0, \quad y'(0) = 1$

   b) $y''' - y' = \cos(t), \quad y(0) = 1, \quad y'(0) = 0, \quad y''(0) = 0$

   c) $y'' + 5y' + 6y = e^t, \quad y(0) = 0, \quad y'(0) = 1$

   d) $y''' + 3y'' + 3y' + y = 0, \quad y(0) = 0, \quad y'(0) = -1, \quad y''(0) = 1$