Honours Degree of Bachelor of Science in Artificial Intelligence
Batch 21 - Level 2 (Semester 2)
CM 2320 - Mathematical Methods

Tutorial 5

1. The Laplace transform of $y(t)$ is $Y(s)$, $y(0) = 3$, $y'(0) = 1$. Find the Laplace transforms of the following expressions:

   a) $y'' + 2y' + 3y$

   b) $3y'' - y' + 2y$

   c) $-4y'' + 5y' - 3y$

   d) $3\dfrac{d^2y}{dt^2} + 6\dfrac{dy}{dt} + 8y$

   e) $4\dfrac{d^2y}{dt^2} - 8\dfrac{dy}{dt} + 6y$

2. Find the inverse Laplace transforms of the following functions:

   a) $\dfrac{(s+1)}{(s+1)^2 + 4}$

   b) $\dfrac{2s+3}{s^2 + 6s + 13}$

   c) $\dfrac{s-1}{2s^2 + 8s + 11}$

   d) $\dfrac{3s^2 + 6s + 2}{s^3 + 3s^2 + 2s}$

   e) $\dfrac{5s+2}{(s+1)(s+2)}$

   f) $\dfrac{s-1}{2s^2 + 8s + 11}$

3. Express the following expressions as partial fractions, using complex numbers if necessary. Hence find their inverse Laplace transforms.

   a) $\dfrac{3s-2}{s^2 + 6s + 13}$

   b) $\dfrac{2s+1}{s^2 - 2s + 2}$

   c) $\dfrac{2s+3}{-s^2 + 2s - 5}$

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