Electrical, Electronic and Computer Engineering

School of Engineering & Physical Sciences

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| **Time and Frequency Signal Analysis (B39SB)** |

**Matlab Lab 2**

### Laplace transform, inverse Laplace transform, solving differential equations, pole-zero diagram

In this lab, students do Matlab exercises on Laplace transform, inverse Laplace transform, using Laplace transform to solve differential equations, finding poles and zeros of transfer functions and plot pole-zero diagram. Note the Laplace transform in Matlab is one-sided Laplace transform.

1. Find Laplace transform of the following functions by modifying the example file “Laplace\_transform.m”.

(i) (1 mark)

(ii) (1 mark)

(iii) (1 mark)

2. Find inverse Laplace of the following functions by modifying the example file “Inverse\_laplace\_transform.m”

(i) ( 1 mark)

(ii) (1 mark)

3. Solving the following differential equations based on the example “Sol\_diff\_example.m”. Plot the solution y(t) as t for the interval [0, 10] for each problem. Alternatively solving the equation by hand for Y(s), then find y(t) using Matlab.

(i) . (3 marks)

(ii) (6 marks)

4. Find poles and zeros of the following transfer functions and plot pole-zero diagram by modifying Pole\_Zero\_diagram\_example1.m.

(i) (3 marks)

(ii) (3 marks)