

MATH2130: Ordinary Differential Equations

LAST EXERCISE SHEET: LAPLACE TRANSFORMS AND DIFFERENTIAL EQUATIONS

You do not have to hand solutions in. Model solutions will be available on the course website.

- 1.) Solve the following initial value problem using Laplace transforms:

$$y''(x) + 2y'(x) + 2y(x) = e^{-2x} \quad \text{with initial conditions } y(0) = 0 \text{ and } y'(0) = 0.$$

- 2.) (a) Use the convolution theorem to calculate the inverse Laplace transform of $\frac{1}{s^3 - s^2}$.

- (b) Solve the initial value problem

$$y''(t) - y'(t) = H(t - 1) \quad \text{with initial conditions } y(0) = 0 \text{ and } y'(0) = 0,$$

where H is the Heaviside function.