MTH0210 DIFFERENTIAL EQUATIONS
FINAL EXAM QUESTIONS

Remarks:

- Show all your work for each of the questions.
- Solve each of the questions on seperate papers and write your name, surname, student number and sign each of the papers.

1. Solve the differential equation

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = \frac{x}{e^x}.$$

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2. Solve the differential equation

$$\left(x^3 + y^2\sqrt{x^2+y^2}\right)dx - xy\sqrt{x^2+y^2}dy = 0.$$

3. Find the orthogonal trajectories of the family of curves given with

$$x = \frac{y^2}{2} + \frac{c}{y^2}.$$

4. Solve the initial value problem

$$y'' + 2y' + y = te^{-2t}$$

$$y(0) = 1,\ y'(0) = 0$$

using Laplace transform.

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