

**DIFFERENTIAL EQUATIONS
CONTROL I**

7th of November, 2017
Degree in Biomedical Engineering.

Time: 90 minutes

Problem 1 (2.5 points)

Solve the equation:

$$(3x^2y^2 - y \cos x)dx = (\sin x - 2x^3y)dy.$$

Problem 2 (2.5 points)

Find the solution of:

$$x^4yy' + \left(\frac{3}{2}y^2 + 1\right)x^3 = 1.$$

Problem 3 (2.5 points)

Solve the following equation:

$$xy'' + 3y' + \frac{1}{x}y = 4x^2.$$

Problem 4 (2.5 points)

Solve the problem:

$$\begin{cases} x'' - 2x' + x = f(t) = \begin{cases} e^t, & 0 \leq t < 2 \\ 0, & 2 \leq t, \end{cases} \\ x(0) = x'(0) = 0; \end{cases},$$