

# MA 3475 Exam 1 Review Problems

February 15, 2021

Find the extremal(s) of the following functionals.

## Problem 1

$$J[y] = \int_a^b \left( 3x + \sqrt{y'(x)} \right) dx$$

## Problem 2

$$J[y] = \int_a^b \left( y(x) - y(x)y'(x) + x(y'(x))^2 \right) dx, \quad a > 0$$

## Problem 3

$$J[y] = \int_a^b \sqrt{1 + (y'(x))^2} dx$$

## Problem 4

$$J[y] = \int_a^b \left[ 2y(x) + (y'(x))^2 \right] dx$$

## Problem 5

$$J[y] = \int_a^b \left[ y^2(x) - 4y(x)y'(x) + 4(y'(x))^2 \right] dx$$