

Math 3280 Worksheet 6: Numerical methods and substitution

Group members (2 to 4): \_\_\_\_\_

(1) For the initial value problem  $y(1) = 1$  and  $\frac{dy}{dx} = \left(\frac{y}{x}\right) \left(\frac{y-x}{x+y}\right)$ , approximate

$y(2)$  by using:

(a) 1 step of the improved Euler method

(b) 1 step of the 4th-order Runge-Kutta method.

(2) Optional: for extra credit try to find the most accurate answer you can to the previous initial value problem; a bonus will be given for the answer with the most correct digits.

- (3) Find the solution to the initial value problem  $y' = 2y/x + y^2/x^2$ ,  $y(1) = -2$  using the substitution  $v = y/x$ .