Math 363   Homework Due Friday, October 6   Name _____

NOTE: Use this form. This homework is an individual effort; you may not consult with anyone else.

1. Write the initial-value problem

$$(1 + t^2)y'' + y' - y = 0, \quad y(0) = 1, \quad y'(0) = -1$$

   as a system of two first-order differential equations.

$$\frac{dy}{dt} = v, \qquad y(0) = \underline{\hspace{1cm}},$$

$$\frac{dv}{dt} = \underline{\hspace{4cm}}, \qquad v(0) = \underline{\hspace{1cm}}.$$

2. Suppose you need to know the value of $y(3)$ to 5 decimal places. Since you can't solve the initial-value problem exactly, you decide to solve it numerically using a fourth-order Runge-Kutta method. What plan can you use to guarantee 5-decimal place accuracy? Be precise. Use only the space provided.

3. Carry out the plan described in #2. (Don't give the details here.) To 5 decimal places,

$$y(3) = \underline{\hspace{3cm}}.$$