

MATHEMATICAL MODELING, MATH329, FALL 2009, SHEPHERD UNIVERSITY
ASSIGNMENT 1
DUE TUESDAY, AUGUST 25, 2009

1. Read and understand. Chapter 1 and Sections 2.1, 2.2, 2.3, 2.4

2. Report. Write an approximately one-page (single spaced, two-paged double spaced) report on either of two mathematicians. Either the inventor of

- differential equations or
- the geometric method as applied to differential equations.

3. First order systems and classifications. Write each of the following equations as a system of first order equations. Also be sure to classify the original equation.

a)

$$u'' + \frac{1}{2}u + 2u = 0$$

b)

$$u'' + \frac{1}{2}u + 2u = 3 \sin t$$

c)

$$t^2 u'' + tu' + \left(t^2 - \frac{1}{4}\right)u = 0$$

d)

$$u'''' - u = 0$$

4. Memorize. Know the table on page 5, Table 1.1.1.

5. Direction fields. Produce a direction (slope) field for each of the following equations. Also be sure to classify the equation.

a)

$$y' = y + 2$$

b)

$$y' = -y(5 - y)$$

c)

$$y' = t + 2y$$