MATHEMATICAL MODELING, MATH329, FALL 2009, SHEPHERD UNIVERSITY
ASSIGNMENT 2
DUE TUESDAY, SEPTEMBER 1, 2009

1. Report. Write an approximately one-page (single spaced, two-paged double spaced) report on the other of the two mathematicians. The inventor of

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

2. Solving first order linear equations.

- Draw direction field for the equation.
- Draw the solution.
- Solve using the integrating factor.

a)

$$\dot{y} - y = 2te^{2t}, \qquad y(0) = 1$$

b)

$$\dot{y} + \frac{2}{t}y = \frac{\cos t}{t^2}, \qquad y(\pi) = 0,\ t > 0$$

c)

$$ty' + (t+1)y = t, \qquad y(\ln 2) = 1$$

3. Solving first order non-linear equations.

- Solve (separate).
- Plot the graph of the solution.
- When is the solution defined.

a)

$$\dot{y} = \frac{e^{-t} - e^{t}}{3 + 4y}, \qquad y(0) = 1$$

b)

$$\sin 2t\ dt + \cos 3x\ dx = 0 \qquad x(\pi/2) = \pi/3$$

c)

$$t\ dt + ye^{-t}\ dy = 0, \qquad y(0) = 1$$

4. Problems from book.

- Section 2.1, problems 1- 5
- Section 2.2, problems 1, 3, 6, 8, 9