

This Lecture Activity is designed to have you actively work with the lecture notes presented in class and available on my website. This activity is meant to keep you engaged and current with the class, so there is a fairly rapid turn around (due by **Tues. Feb 8 by noon**). There are 4 problems that require written answers, which are entered into **Gradescope**.

**Note:** For full credit you must show intermediate steps in your calculations.

1. This problem has you use nonlinear computer solvers to find points of intersection and appreciate the differences in growth of polynomials, exponentials, logarithms, and fractional powers. Be sure to tell how you found your points of intersection.

a. (3pts) Consider the functions:

$$f(x) = 1.3e^{0.8x} \quad \text{and} \quad g(x) = 1.8x^4.$$

Find the three points of intersection for these functions.

b. (2pts) Consider the functions:

$$h(x) = 2.1 \ln(x) \quad \text{and} \quad k(x) = 1.5x^{1/5}.$$

Find the two points of intersection for these functions. (Recommended use of Maple or MatLab to solve.)

2. (3pts) Consider the ODE given by:

$$\frac{dy}{dt} = t \cos(t^2), \quad y(0) = 3.$$

Solve this IVP. (Slides Linear 12–13)

3. (4pts) Consider the ODE given by:

$$\frac{dy}{dt} - 2ty = 12t, \quad y(0) = 5.$$

Solve this IVP. (Slides Linear 14–21)

4. (4pts) Consider the ODE given by:

$$t \frac{dy}{dt} - 2y = 4t^3 \sin(4t), \quad y(1) = 2.$$

Solve this IVP. (Slides Linear 14–21)