

## 550.291 Linear Algebra & Differential Equations

11/2007

From the text:

chapter 1.1 / 6,7

chapter 1.2 / 4,7,8

chapter 1.4 / 1,12,19,40

1.1. Solve for  $y = y(x)$  (if not explicitly, then implicitly):

$$y' = \frac{1}{x^2(1 + y + 7y^6)}, \quad y(1) = 1.$$

1.2. (Pennies from “heaven”) The Empire State Building is about 1250 feet tall. If a penny is dropped from the top of the Empire State Building (with no initial velocity), how long will take for it to reach the ground? and at what velocity will it hit the ground? Assume that there are no dominant up-drafts around the building, e.g., assume a frictionless environment and the constant acceleration due to gravity there is 32 ft/sec<sup>2</sup>.

(Source: [www.straightdope.com/classics/a1\\_225.html](http://www.straightdope.com/classics/a1_225.html))