Reading Questions for Boyce and DiPrima, Section 2.4

[Submit your responses by 1 am, Wed., Feb. 13, using the webform below.]

1. When in **normal form**, a first order ODE looks like

   \[ y' = f(t, y). \]

   So, a first order **linear** ODE in **standard form** is converted to normal form via an easy subtraction:

   \[ y' + p(t)y = g(t) \quad \Rightarrow \quad y' = g(t) - p(t)y =: f(t, y). \]

   Accordingly, if there is a rectangle \( R \) in the \( ty \)-plane enclosing the point \((t_0, y_0)\) and inside which \( f(t, y) = g(t) - p(t)y \) and \( \frac{\partial f}{\partial y} = -p(t) \) are both continuous, then Theorem 2.4.2 (of which Theorem 2.8.1 is essentially a duplicate) guarantees the existence of a unique solution to the IVP

   \[ y' + p(t)y = g(t) \quad \text{subject to} \quad y(t_0) = y_0. \quad (1) \]

   Since Problem (1) is linear, Theorem 2.4.1 likewise applies. But does it offer any further information than does Theorem 2.4.2? If so, what?

2. What is the point of

   - Example 1?
   - Example 2?
   - Example 3?
   - Example 4?

3. Identify one item (a concept, a step in an example, a statement, etc.) from this reading assignment you found difficult or confusing.