## 2011 #5

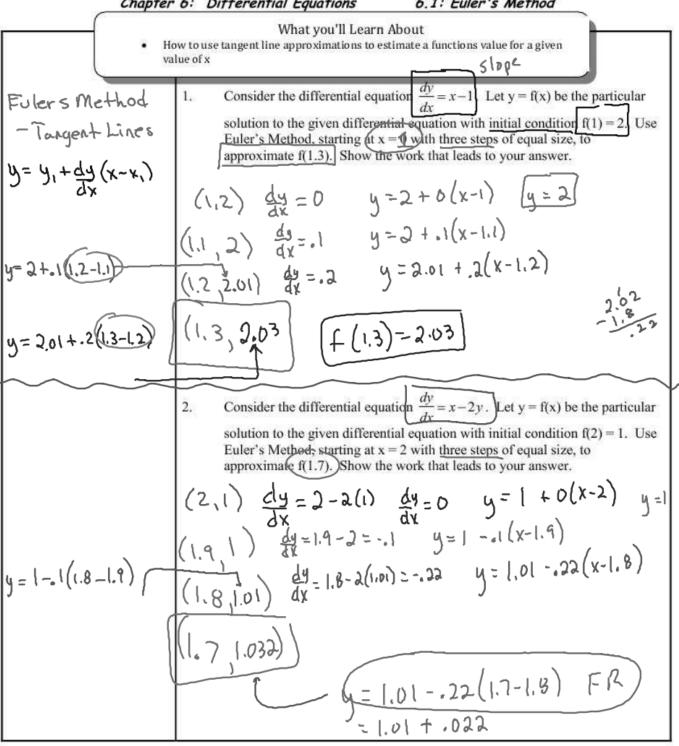
At the beginning of 2010, a landfill contained 1400 tons of solid waste. The increasing function W models the total amount of solid waste stored at the landfill. Planners estimate that W will satisfy the differential equation  $\frac{dw}{dt} = \frac{1}{25}(W - 300)$  for the next 20 years. W is measured in tons, t is measured in years from the start of 2010.

a) Use the line tangent to the graph of W at t = 0 to approximate the amount of solid waste that the landfill contains at the end of the first 3 months of 2010 ( $t = \frac{1}{4}$ ).

b) Find  $\frac{d^2w}{dt^2}$  in terms of W. Use  $\frac{d^2w}{dt^2}$  to determine whether your answer in part a is an underestimate or an overestimate of the amount of solid waste that the landfill contains at time  $t = \frac{1}{4}$ .

c) Find the particular solution W=W(t) to the differential equation  $\frac{dw}{dt} = \frac{1}{25} (W - 300)$  with initial condition W(0) = 1400.

## CALCULUS: Graphical, Numerical, Algebraic by Finney, Demana, Watts and Kennedy Chapter 6: Differential Equations 6.1: Euler's Method



9 | Page