Math 3280: DE+LA. Test 1 Practice Problem answers. Prof. Bruce Peckham

1. (a) $y(x) = 2e^{3x}$

   (b) $P(s) = \frac{3}{2}s^2 + C$

   (c) $x(t) = \frac{1}{7}e^{2t} + Ce^{-\frac{1}{3}t}$

   (d) $\frac{y^2}{2} = \frac{x^3}{3} + \ln|x| + C$ (implicit solution)

2. $y'(x) = x + y$ (many other correct answers)

3. $k > 0$ because $\dot{T}$ should be negative if $T(t)$ is greater than T_a.

4. See book, fig 1.3.6, p. 20.

5. $5.01 + \left(\frac{1.05^2}{5.01}\right)(.05)$

6. $5/26$

7. ...

8. $v'(x) = \frac{1}{x}(v^3 + v^2 - v)$. Separable.

9. $\dot{x}(t) = (.005)(1) + 2(.01) - 4\frac{x(t)}{100-t}$, $x(0) = 0$; $x(t) =$ amount of salt in tank at time t, measured in kg.; valid for $t \in [0, 100]$, since after $t = 100$ the tank is empty.