1. (a) order 1, nonlinear, NA
   (b) order 2, nonlinear, non-homogeneous
   (c) order 1, linear, homogeneous
   (d) order 4, linear, homogeneous
   (e) order 2, nonlinear, NA

2. Refer the book.

3. (a) $H = e^{\int P(x) dx}$
   (b) $H = x, y = x + \frac{C}{x}$

4. (a) For $r^2 + 7r + 10 = 0$, we get $r = -5, -2$. So $e^{-5t}$ and $e^{-2t}$ are the solutions. The Wronskian is $3e^{-7t} \neq 0$.
   (b) $y = -1e^{-5t} + 3e^{-2t}$

5. Substitute $v = y^{-3}$, $y^3 = \frac{7e^{5t}}{15+Cxe^{5t}}$

6. (a) First order linear equation, with $\rho = e^{0.1t}$, $v = 50 - 50e^{-0.1t}$. So, maximum speed is 50 ft/sec, (as $t \to \infty$).
   (b) Solving $\frac{dv}{dt} = 0$, we get $v = 50$ as our equilibrium solution. (Same one as the first part. But you can not use the second part to solve the first, since the initial data may change your answer.). For $v > 50$, $\frac{dv}{dt} < 0$ and for $v < 50$, $\frac{dv}{dt} > 0$. These two conditions show the equilibrium is stable.

7. $y = C_1e^{4x} + C_2e^{x} + \frac{3}{4}x + \frac{15}{16}$