Homework 1 - p. 43-44

1. a) $y(t) = Ce^{5t}$

   b) $y(t) = Ce^{-3t}$

2. a) $y(t) = e^{5t}$, $y(t) = e^{-3t}$

   c) $y(t) = e^{5} \cdot e^{5t}$, $y(t) = e^{-3} \cdot e^{-3t}$

4. a) $f(x) = \sin x$

   $f'(x) = \cos x$

   $x_0 = 0$

   $g_1(x) = 0 + 1 \cdot (x-0) = x$

   $g_1(x) = f(x_0) + f'(x_0) \cdot (x - x_0) \rightarrow 1^{st}$ order Taylor approx of F at x_0

   c) $f(x) = \frac{x}{1+x^2}$ $f'(x) = \frac{(1+x^2) - x \cdot (2x)}{(1+x^2)^2}$ (derivative of a quotie

   $x_0 = 0$

   $g_1(x) = 0 + 1 \cdot x = x$

   d) $f(x) = e^{x} \cdot \sin x$ $f'(x) = e^{x} \cdot \cos x + e^{x} \cdot \sin x$ (product rule)

   $g_1(x) = 0 + 1(x - x_0) = x$

5. One solution is birth rate - death rate $= 2^{4}p - p = 15p = \frac{dP}{dt}$.

   Alternatively: $= 4p - p = 3p = \frac{dP}{dt}$.

   However, neither of these solutions are particularly accurate given that this is a recursive model. (As we explained in section)