Math 2080: Differential Equations
Worksheet 2.5: Linear differential equations

NAME:

1. For each of the first-order differential equations, decide whether it is linear or nonlinear. If the equation is linear, state whether it is homogeneous or inhomogeneous.

   (a) $y' = ky$
   (b) $y' = k(72 - y)$
   (c) $y' = y(4 - y)$
   (d) $y' = e^y$
   (e) $3y' + 5y = 3\cos 2t$
   (f) $3y' + 5y = 3\cos 2y$
   (g) $y' = 4t^2y - \sin t$
   (h) $y' = 4ty^2 - \sin t$

2. Find the general solution to $y' - 2y = 5e^{3t}$ by first solving (in your head) the related *homogeneous equation*, and then looking for a particular solution of the form $y_p(t) = ae^{3t}$.

3. Find the general solution to $y' - 2y = t$ by first solving the related *homogeneous equation*, and then looking for a particular solution of the form $y_p(t) = at + b$.