MAT 239 (Differential Equations), Prof. Swift
Worksheet 7 on Linear 1st Order ODEs

A common IVP in applications has the form $\dfrac{dy}{dt} = -2y + 6, \quad y(0) = 0.$ (t is time.)

0. Is $y(t) = 0$ a solution to the ODE? yes/no Is $y(t) = k$ a solution to the ODE for some constant k? yes/no. If so, write down the constant solution.

1. Put the ODE into standard form and identify $p(t)$ and $g(t)$. A theorem says that the particular solution is defined for all t, since p and g are continuous for all t.

2. Follow the recipe for 1st order linear ODEs to find the general solution.

3. Find the particular solution to the IVP, and sketch the solution for $t \geq 0$ without a calculator. Draw a dotted line at the horizontal asymptote. On the axes, indicate $y = 0$, $y = 3$, $t = 0$, and the approximate position of $t = \frac{1}{2}$. (Hint: $e = 2.718\ldots \approx 3$.)