Meeting 1 Worksheet (6/23/22)

1. Draw a direction field and determine the behaviour of y as $t \to \infty$.

   (a) $y' = y + 2$

   (b) $y' = t + y$

2. Solve each initial value problem (IVP) and plot solutions for several values of y_0.

   (a) $\frac{dy}{dt} = y - 5$, $y(0) = y_0$

   (b) $\frac{dy}{dt} = 2y - 5$, $y(0) = y_0$

3. A falling object satisfies the IVP

$$\frac{dv}{dt} = 9.8 - \frac{v}{5}, \quad v(0) = 0.$$

   (a) Find the amount of elapsed time required for the object to reach 98 percent of its terminal (or limiting) velocity.

   (b) How far does the object fall during that time?