
2. Taylor: Problem 2.7.

3. Taylor: Problem 2.11.

   **Quiz version:**
   Consider an object of mass $m$ that is thrown vertically up in the Earth gravitational field with an initial speed $v_{y0}$ in a linear medium with drag force $-bv_y$. The solution of the Newton equations is

   $$v_y(t) = (v_{y0} + v_{ter})e^{-t/\tau} - v_{ter}$$

   $$y(t) = (v_{y0} + v_{ter})\tau(1 - e^{-t/\tau}) - v_{ter}t$$

   where we assumed $y(0) = 0$ and used the notation: $\tau = m/b$ and $v_{ter} = mg/b$. The $\hat{y}$ axis is oriented upwards.

   (a) Find the time for the object to reach the highest point $y_{max}$ on the trajectory and write down the expression for $y_{max}$ in the simplest possible form.

   (b) Show that as $b$ approaches zero, this expression reduces to $y_{max} = v_{y0}^2 / 2g$.

   You may need the following expansion:

   $$\ln(1 + x) = x - \frac{x^2}{2} + \frac{x^3}{3} \ldots$$


5. Taylor: Problem 2.13. Explain your choice of sign in the expression for $v(x)$. Is the sign the same for all phases of the motion?