

2. (10 points) An apple is placed in a room whose air temperature is fixed at 50°F . Let $T(t)$ be the temperature of the apple at time t , which is measured in hours. According to Newton's Law of Heating and Cooling, the rate of change of the apple's temperature satisfies

$$\frac{dT}{dt} = k(T - 50).$$

- (a) (2 pts.) What is the value of k if the temperature decreases at an instantaneous rate of 3°F per hour when the temperature T of the apple is 65 ?

- (b) (5 pts.) Now assume $k = -0.1$. Solve the initial value problem $dT/dt = k(T - 50)$ with $T(0) = 30$.

- (c) (3 pts.) Briefly explain what the solution from part (b) says about the temperature of the apple over the time interval $[0, \infty)$.