Instructions.

In this worksheet we explore Newton’s Cooling Problem.

You must show all work for full credit, as unsubstantiated answers will result in little or no credit. Clearly indicate your answers, and note that exact values are expected. You may use a calculator on this worksheet.

Newton’s Cooling

Newton’s Law of Cooling states that the temperature change of an object placed in an environment is proportional to the difference between the temperature of the environment and the temperature of the object. We let \( T(t) \) be the temperature of the environment and \( f(t) \) be the temperature of the object. Then

\[
\frac{df}{dt} = k (T(t) - f(t))
\]

Example 1. Suppose a pizza is placed in an old unreliable oven, which is then turned on. The initial temperature of the pizza is 30°F, and the oven temperature is gradually rising between \( t = 0 \) to 30 (in minutes) with temperature given by \( T(t) = 70 + 10t \). Suppose the heat constant of the pizza is .4. What is the temperature of the pizza at the end of 30 minutes?
Example 2. What if the oven had been preheated and was already 370° when the pizza was put in?