**Newton’s Law of Cooling**

**Solve the problem, showing all work! For your answer, I would like to know how many minutes prior to midnight the murder occurred, and then please give the approximate time of the murder.**

**You will need to solve the equation twice. First, use temperatures and time references you know (temperature at midnight and temperature later) in order to find *k*. Then, use that value of *k* and other temperatures (beginning temperature and temperature at midnight) to find *t*, time.**

Newton's Law of Cooling states that an object with temperature  in an environment with temperature  will have temperature  after *t* minutes according to the following equation:

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A coroner arrives at the scene of a murder at 12:00 a.m. and immediately determines the temperature of the victim to be 93.6o F. Twenty minutes later, the temperature has fallen to 92.8o F. If the temperature of the room is 72o F, when was the murder committed? (Assume the victim's temperature at time of death was normal body temperature, 98.6o F.)

**k = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ t = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**The murder occurred \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ minutes prior to midnight, which was approximately \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a.m./p.m.**