AP CALCULUS
2011AB1 NAME: PERIOD:
9 POINTS

You *MAY* use a calculator.

t (minutes)	0	2	5	9	10
$H(t)$ (degrees Celsius)	66	60	52	44	43

As a pot of tea cools, the temperature of the tea is modeled by a differentiable function H for $0 \leq t \leq 10$, where time t is measured in minutes and temperature H is measured in degrees Celsius. Values of $H(t)$ at selected values of t are shown in the table above.

(a) Use the data in the table to approximate the rate at which the temperature of the tea is changing at time $t = 3.5$. Show the computations that lead to your conclusion.

(b) Using correct units, explain the meaning of $\frac{1}{10}\int_0^{10} H(t)\, dt$ in the context of the problem. Use a trapezoidal sum with the four subintervals indicated by the table to estimate $\frac{1}{10}\int_0^{10} H(t)\, dt$.

(c) Evaluate $\int_0^{10} H'(t)\ dt$. Using correct units, explain the meaning of the expression in the context of this problem.

(d) At time $t = 0$, biscuits with temperature $100°$Celsius were removed from an oven. The temperature of the biscuits at time t is modeled by a differentiable function B for which it is known that $B'(t) = -13.84e^{-0.173t}$. Using the given models, at time $t = 10$, how much cooler are the biscuits than the tea?