

You are encouraged to work in groups of two to four on this assignment and make a single group submission. Each problem is worth 3 points for correct and clearly justified answers. An additional quality point will be awarded to submissions which are presented in a manner appropriate to good college-level work.

1. a) A cup of coffee starts at  $190^{\circ}$  F and cools according to the differential equation  $\frac{dT}{dt} = 0.05(70 - T)$ . Using  $\Delta t = 5$  minutes, approximate the temperature of the coffee after 15 minutes.  
b) What can you say about how your approximation from part a *should* compare to the true temperature after 15 minutes?
  
2. a) A paper cup of coffee sitting under a ceiling fan starts at  $170^{\circ}$  F and cools according to the differential equation  $\frac{dT}{dt} = 0.2(70 - T)$ . Using  $\Delta t = 5$  minutes, approximate the temperature of the coffee after 15 minutes.  
b) What can you say about how your approximation from part a *should* compare to the true temperature after 15 minutes?
  
3. Solve the differential equations from problems 1 and 2 by separation of variables and find the true temperatures after 15 minutes.

