Problem Set 3                Calculus 2                Due 3/22/11

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° 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° 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.