Name _____

Homework 24
section 11.5 & 11.6

1. (5) A freshly brewed cup of coffee (mmmm... coffee) is initially 90°C. The coffee is in a room which is kept at 24°C. After 5 minutes the coffee has cooled to 80°C. Write a differential equation satisfied by T, the temperature of the coffee. Solve this differential equation and use it to determine how long it will take the coffee to cool to 57°C.

2. (5) A coroner arrives at exactly noon to the scene of a recent murder. At arrival, the coroner notes that the body has cooled from a live temperature of 98.6° F to 87° F. An hour later she notes that the body has now cooled to 82° F. The apartment has been maintained at a constant 71° F. Write and solve a differential equation to determine when the murder occurred.

3. (5) A mothball is in the shape of a sphere and starts with radius 1 cm. The material in the mothball evaporates at a rate proportional to the surface area. After one month, the radius is 0.5 cm. How many months (from the start) is it before the radius is 0.2 cm?

4. (5) Water leaks out of a cylindrical barrel at a rate proportional to the square root of the depth of the water at that time. If the water level starts at 40 inches and drops to 36 inches in 2 hours, how long will it take for all of the water to leak out of the barrel?