Mathematics 134 – Intensive Calculus for Science 2
Discussion 4 – *A Mathematical Crime Story*
April 12, 2006

Apologies in advance to any sensitive Italian-Americans or fans of "The Sopranos"(!)

Background

There's a "war" going on in the Bigtown, New Jersey Mafia. Carmine "Calamari" Squidiarini is the longtime head of the "family," but one of his lieutenants, Biagio "Bacala" Bacilieri, has been wanting to declare independence and set up on his own, taking over most of Squidiarini's territory and business in garbage removal, trucking, and "other things."

The Situation

Shortly before midday, "Bacala's" dead body is found in a back room of the Bella Napoli Pizzeria and Social Club (the unofficial headquarters of Squidiarini's crime family). The room is air-conditioned to a constant 70° F. He has been "whacked" mob-style with one bullet in the head. Right after "Bacala's" body is discovered, at 12 Noon, its temperature is 80° F. By 1 PM, it has not been moved, and its temperature has decreased to 75° F.

You are the county coroner's office who is called in to make the temperature measurements and determine a time of death (which is certainly the same as the time "Bacala" was "whacked," given the nature of his gunshot wound!).

The Questions

A) Write down the differential equation giving Newton's Law of Cooling in this setting.
B) Assuming "Bacala" had a normal temperature of 98.6° F when he died, when did the "hit" take place?
C) Carmine Squidiarini has an airtight alibi for the period 10:30 am - 12 noon since he was in court testifying in a RICO (racketeering) trial. Could he have made the "hit" personally if it takes 12 minutes to get from the Bella Napoli Pizzeria and Social Club to the courthouse?
D) But wait! New evidence has come to light that "Bacala" had a terrible cold (wadded up Kleenex were found next to the body) and his wife says he was running a 104° F fever the day of the "hit." What does this new knowledge say about the time of death? Could Carmine have done the "hit" given this information?

Assignment

Write up your group's answers and hand in at end of class.