Math 53 Groupwork problems #1

We will begin these problems in class on Friday, 1/8/99. Work in groups of 2 to 4 people. You are not finished with a problem until *everyone* in the group understands the solution. Don't be shy! Ask about what you don't understand and share what you do understand.

1. A cup of MacDonald's coffee (before the famous lawsuit) at 90°C is placed in a room at 20°C. After 5 minutes, the coffee has cooled to 75°C. To the nearest minute, how long will it take for the coffee to cool to 40°C?

2. Suppose $y' = x - y$ and $y(0) = 10^6$. What is the nearest integer to $y(100)$?

3. A hole is drilled straight through the earth and a person jumps in. To the nearest minute, how long will it take to reach the other side (Australia?)? Make the following assumptions:

   (a) The acceleration of the person in the hole is proportional to the distance from the center of the earth. (This follows from the assumption that there is no friction and that the earth has constant density. Those of you who know physics might want to try to figure out why.)

   (b) The radius of the earth is 6400 km.

   (c) The acceleration due to gravity at the surface is 9.8m/s^2.

   Note: this problem does not fit into the mold of the examples we have been doing so far. See if you can solve it anyway.