

**Homework for Wednesday, 10/12/05      Name:**

§10.3 #38. A certain small country has \$10 billion in paper currency in circulation, and each day \$50 million comes into the country's banks. The government decides to introduce new currency by having the banks replace old bills with new ones whenever old currency comes into the banks. Let  $x = x(t)$  denote the amount of new currency in circulation at time  $t$ , with  $x(0) = 0$ .

- (a) Formulate a mathematical model in the form of an initial-value problem that represents the "flow" of the new currency into circulation.
- (b) Solve the initial-value problem found in part (a).
- (c) How long will it take for the new bills to account for 90% of the currency in circulation?

§10.4 #10. After 3 days a sample of radon-222 decayed to 58% of its original amount.

- (a) What is the half-life of radon-222?
- (b) How long would it take the sample to decay to 10% of its original amount?

§10.4 #16. A freshly brewed cup of coffee has temperature  $95^{\circ}\text{C}$  in a  $20^{\circ}\text{C}$  room. When its temperature is  $70^{\circ}\text{C}$ , it is cooling at a rate of  $1^{\circ}\text{C}$  per minute. When does this occur?